

Azooxanthellate Scleractinia (Cnidaria: Anthozoa) of Western Australia

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Abstract – One hundred five species of azooxanthellate Scleractinia are known from Western Australia. Seventy of these species are reported herein as new records for Western Australia, 57 of which are also new to Australia. Eleven new species are described. The study was based on an examination of approximately 1725 specimens from 333 stations, which resulted in additional records of 98 of the 105 known species. New material was examined from six museums, as well as the historical material of Folkesson (1919) deposited at the Swedish Museum of Natural History.

A majority (69/105 species) of the azooxanthellate species known from Western Australia occur in the tropical region of the Northern Australian Tropical Province (bordered to the south by the Houtman Abrolhos Islands and Port Gregory), which can be considered as a southern extension of the larger Indo-West Pacific tropical realm. Nine species are endemic to this region, and the highest latitudinal attrition of species occurs between Cape Jaubert and the Dampier Archipelago. Another 20 species, also known from tropical regions, extend to varying degrees into the Southern Australian Warm Temperate Province. Twelve species are restricted to warm temperate waters of the Southern Australian Warm Temperate Region, most of these species being relatively shallow in depth distribution. A majority of species (53) occur at depths shallower than 200 m, 46 occur exclusively deeper than 200 m (to 1011 m), and 6 species cross the 200 m isobath.

Commensal relationships (galls) with ascothoracidan crustaceans were found with two corals hosts (*Madrepora oculata* and *Deltocyathus magnificus*), and with acrothoracian cirripedes (thecal borings) with six coral hosts: *Flabellum politum*, *Truncatoflabellum folkessoni*, *T. formosum*, *T. australiensis*, *Javania lamprotichum*, and *Dendrophyllia alcocki*.

INTRODUCTION

Veron and Marsh (1988) listed 318 species of "hermatypic" (or zooxanthellate) Scleractinia from Western Australia. The term zooxanthellate simply means that the coral lives in symbiosis with dinoflagellate algae and thus must occur within the euphotic zone and in tropical to subtropical temperatures, and usually implies that the coral contributes to reef structure, although not necessarily (Schuhmacher and Zibrowius 1985). There is, however, a second ecological class of Scleractinia known as azooxanthellate corals, literally those species that do not live symbiotically with dinoflagellate algae. These species are not limited to the euphotic zone or by warm temperatures and are ubiquitous, known from the Norwegian Sea to Antarctica from the intertidal to 6328 m (Cairns and Stanley 1982). Coralla of azooxanthellate species are usually small, solitary, and do not contribute to reef structure, but exceptions to all these conditions occur. Approximately equal numbers of both types of coral species occur in the world oceans. 105 species of azooxanthellate corals occur off the entire coast of

Western Australia, ranging from the intertidal to 1011 m. These, combined with the known zooxanthellate coral fauna, result in a total of 422 scleractinian species from Western Australia, one species, *Heteropsanmia cochlea*, occurring in both forms.

The history of the azooxanthellate coral fauna of Western Australia is not lengthy. Only 13 publications report 35 azooxanthellate species from this region, the first (Rehberg, 1892) being *Heterocyathus pulchellus* from the "Westkuste Australiens", a species later synonymized with *H. sulcatus* (Verrill, 1866) by Hoeksema and Best (1991).

Ten new records were added by Folkesson (1919), resulting from collections made by E. Mjöberg's Swedish Scientific Expeditions to Australia (1910–1913). These records, which include three new species and one new genus, were from WSW of Cape Jaubert and off Broome at depths of 11–42 m, and include: *Truncatoflabellum spheniscus* (originally reported as *Flabellum rubrum*, in part); *T. aculeatum* (reported as *F. rubrum*, in part); *T. angiosomum*; *Placotrochus laevis*; *Heterocyathus aequicostatus*; *H. alternatus*; *H. hemisphericus* (reported as

Spongiocyathus typicus); *Rhizosmilia multipalifera* (reported as *Paracyathus porphyreus*); *Conocyathus gracilis* (reported as *Trematotrochus zelandiae*); and *Leptopsammia columnata* (Figs 9f, i). An eleventh species, *Paracyathus profundus* Duncan, 1889, was reported, but this specimen is not preserved well enough to verify its identification. Folkesson's specimens are deposited at the Swedish Museum of Natural History, Stockholm.

In a paper reporting deep-water corals from South Australia, Victoria, Tasmania, and New South Wales, Hoffmeister (1933) also reported one species, *Flabellum tuthilli*, from the continental slope of the Great Australian Bight off Western Australia.

The Miocene fossil species *Trematotrochus lateropenus* Dennant, 1899 was reported by Wells (1942) from Langley Park Bore, Perth. As noted in the species account, this fossil may be *Trematotrochus verconis* Dennant, 1904.

In his book on Australian and Indo-Pacific reef corals, Veron (1986) also included a short chapter (pp. 597–610) on Australian azooxanthellates. Although exact localities and specific identifications are sometimes wanting, eight records of Western Australian azooxanthellate corals can be extracted from this book, including the following six new records: *Deltocyathus magnificus* (reported as *Fungiacyathus*); *Cyathelia axillaris*; *Trochocyathus apertus* (reported as *Premocyathus ? compressus*); *Endopachys grayi* (reported as *Endopachys* sp.); *Heteropsammia cochlea*; and *Tubastraea coccinea* (reported as *T. aurea*). Additional Western Australian records of *Heteropsammia cochlea* can also be found in Veron and Marsh (1988) and Veron (1993).

Grygier (1991) reported two Western Australian azooxanthellate species as hosts for petraroid ascothoracid Crustacea, one of the species, *Flabellum magnificum*, being a new record for this state, the other being *Deltocyathus magnificus*. In the same context, Grygier and Cairns (1996) reported Western Australian *Madrepora oculata* as hosts for these parasites.

In a paper reviewing the Scleractinia of southeastern Australia, Cairns and Parker (1992) also included 13 new records from the southern coast of Western Australia: *Culicia australiensis*, *C. hoffmeisteri*, *Anthemiphyllia dentata*, *Desmophyllum dianthus* (reported as *D. cristagalli*), *Solenosmilia variabilis*, *Conotrochus funiculata* (reported as *Conotrochus brunneus*), *Trematotrochus alternans*, *Platyrochus laevigatus*, *P. hastatus*, *Australocyathus vincentinus*, *Rhizotrochus tuberculatus*, *Notophyllia recta*, and *N. piscicauda* (reported as *Notophyllia* n. sp.). These specimens were collected by the *Soela*, *R/V Comet*, *Adelaide Pearl*, and *BANZARE*, and from the Verco and WAM collections; they are deposited at the South Australian Museum, Western Australian Museum, and NMNH.

An additional record of *Rhizotrochus tuberculatus* from the Late Pleistocene of Cape Burney, southwestern Western Australia was reported by Johnson, Baarli, and Scott (1995).

Finally, Cairns (1995) reported *Conocyathus zelandiae* from King George Sound, and Cairns and Zibrowius (1997) reported three species from the northeastern tip of Western Australia, one of them, *Balanophyllia imperialis*, being a new record for the state.

MATERIAL AND METHODS

Museum Abbreviations:

- AMS Australian Museum, Sydney.
 BMNH British Museum (Natural History), London.
 NTM Museum & Art Gallery of the Northern Territory, Darwin.
 NMNH National Museum of Natural History, Smithsonian, Washington, D. C.
 NMV National Museum of Victoria, Melbourne.
 SAM South Australian Museum, Adelaide.
 SMNH Swedish Museum of Natural History, Stockholm.
 USNM United States National Museum (now the National Museum of Natural History).
 WAM Western Australian Museum, Perth.

Expedition Abbreviations:

- DEKI Danish Expedition to the Kei Islands (1922).
 KARUBAR French-Indonesian expedition (1991) that collected in the southeastern Banda Sea. Named for the Kai, Aru, and Tanimbar Islands.

Morphological Terms Abbreviations:

- GCD Greater Calicular Diameter
 GCD:H Ratio of greater calicular diameter to corallum height
 GCD:LCD Ratio of greater to lesser calicular diameter
 H:D Ratio of height to corallum diameter
 PD:GCD Ratio of pedicel diameter to greater calicular diameter
 Sx, Cx, Px Septa, costae, or pali (respectively) of cycle designated by numerical subscript
 Sx > Sy Septa of cycle x wider than those of cycle y
 SCI Septal Concavity Index: ratio of distance from thecal edge to point of greatest septal inflection to length of thecal face measured along that septum
 SSI Septal Sinuosity Index: ratio of amplitude of lower inner edge of a septum to the thickness of that septum

Table 1 Distribution of the Western Australian Azooxanthellate Scleractinia (∧ no new material; * new to WA; ** new to Australia)

	AUSTRALIA											Depth (m) W. Aust.	Distribution Pattern (See Table 2)		
	Western Australia														
	1	2	3	4	5	6	7	8	9	10	11				
FUNGIACYATHIDAE															
** <i>Fungiacyathus</i> (F.) <i>stephanus</i>	x	x		x				x						304-720	1B
**F. (F.) <i>fragilis</i>				x										400-420	2A
**F. (F.) <i>patiferus</i>	x	x		x		x								101-300	1B
**F. (F.) <i>multicarinatus</i>				x										348-350	1E
**F. (B.) <i>variegatus</i>		x		x										300-302	1C
**F. (B.) <i>granulosus</i>		x		x										302-400	1C
MICRABACIIDAE															
* <i>Letepsammia formosissima</i>	x	x		x		x		x						302-500	2A
** <i>L. fissilis</i>				x										201	-
** <i>Rhombopsammia niphada</i>		x		x										390-696	1C
** <i>Stephanophyllia complicata</i>	x	x		x										260-433	1B
RHIZANGIIDAE															
<i>Culicia australiensis</i>	x			x		x		x						18-180	2A
<i>C. hoffmeisteri</i>				x		x		x						0-10	3A
** <i>Astrangia atrata</i>				x		x		x						46	3A
** <i>Oulangia stokesiana</i>		x		x										intertidal	1C
OCULINIDAE															
<i>Madrepora oculata</i>	x	x		x										304-544	1A
<i>Cyathella axillaris</i>		x			x									12-40	-
ANTHEMIPHYLLIIDAE															
<i>Anthemiphyllia dentata</i>	x	x		x		x		x						154-240	2A
CARYOPHYLLIIDAE															
** <i>Caryophyllia</i> (C.) <i>transversalis</i>		x		x										224-302	1C
**C. (C.) <i>rugosa</i>	x	x		x										180-200	1B
**C. (C.) <i>quadrigenaria</i>		x		x										154-201	1C
**C. (C.) <i>stellata</i>	x				x									240-402	3B
**C. (C.) <i>atlantica</i>		x		x										298-530	1A
**C. (C.) <i>grandis</i>	x	x		x										394-596	1B
**C. (A.) <i>grayi</i>	x	x		x										130-150	1B
**C. (A.) <i>imicristata</i>		x		x										302-450	1C
**C. (A.) <i>decamera</i>		x		x										224-260	1C
** <i>Crispatirochus rugosus</i>		x		x										296-298	1C
* <i>C. inornatus</i>		x		x										302-400	-
** <i>Oxysmilia circularis</i>				x										201-404	1E
** <i>Trochocyathus philippinensis</i>		x		x										100-154	1C
∧ <i>T. apertus</i>														20-230	1C

Table 1 (continued)

	AUSTRALIA											Depth (m) W. Aust.	Distribution Pattern (See Table 2)
	Western Australia										11		
	1	2	3	4	5	6	7	8	9	10			
** <i>Paracalythus rotundatus</i>	?	x		x								30-40	1B
** <i>P. ?fultus</i> Alcock, 1893	x	x		x								350-433	1D
** <i>Stephanocyathus (A.) spiniger</i>	x	x		x		x		x				298-535	2A
** <i>S. (A.) explanans</i>	x	x		x								180-500	1B
<i>Deltocyathus magnificus</i>	x	x		x		x		x				260-696	2A
** <i>D. suluenis</i>	x	x						x				401-530	1C
** <i>D. sarsi</i>	x				x							80	1D
<i>Heterocyathus aequicostatus</i>	x	x		x								0-20	1B
<i>H. alternatus</i>	x	x		x								0-9	1B
<i>H. sulcatus</i>	x	x		x								11-150	1B
<i>H. hemisphaericus</i>	x	x		x								2-46	1C
<i>Conotrochus funicohanna</i>	x	x		x								240-280	2A
** <i>Paraconotrochus zeidlerii</i>	x	x		x				x				304-484	2A
<i>Desmophyllum dianthus</i>	x	x		x				x		x		963-1011	2A
** <i>Thalamophylia tenuescens</i>	x	x		x				x				38	1C
** <i>Asterosmilia marchadii</i>	x	x		x								150-160	1A
" <i>Rhizosmilia multipalifera</i>	x	x		x								11-165	2B
<i>Solenosmilia variabilis</i>	x	x		x				x		x		963-1011	2A
TURBINOLIIDAE													
** <i>Trenatotrochus verconis</i>					x	x						148-183	3A
^ <i>T. alternans</i>					x	x		x				148	3A
<i>Conocyathus zelandiae</i>	x			x					?			4-137	2A
<i>C. gracilis</i>				x								101	1E
** <i>Alatotrochus rubescens</i>		x		x					x			180-350	2A
^ <i>Platytrochus laevigatus</i>				x								26-51	3A
^ <i>P. hastatus</i>				x								148	3A
** <i>Idiotrochus kikitii</i>		x		x					x			201	1C
** <i>Notocyathus venustus</i>		x		x								90-300	1C
** <i>Tropidocyathus lessonii</i>	x	x		x								137-160	1B
** <i>T. labidus</i>		x		x								300-380	1C
* <i>Cyathotrochus pileus</i>	x	x		x								234-348	2A
^ <i>Australocyathus vincentinus</i>	x	x		x					x			148	3A
* <i>Deltocyathoides orientalis</i>	x	x		x								260	2A
GUYNIIDAE													
* <i>Gygnia annulata</i>	x	x		x								137	2A
FLABELLIDAE													
<i>Flabellum (F.) magnificum</i>	x	x		x								306-506	1B
** <i>F. (F.) lamellulosum</i>	x	x		x								280-450	1C
** <i>F. (F.) patens</i>	x	x		x								280	2A

**E. (F.) folksoni	x																		124-173	1E
**F. (F.) politum	x																		45-220	1C
*F. (U.) hoffmeisteri	x										x								302-544	2A
F. (U.) luthilli	x										x								347-550	3A
**F. (U.) marenzelleri	x																		260-348	1C
**F. (U.) deludens	x																		348-360	1B
<i>Truncatoflabellum angiosomum</i>																			22-136	1E
**T. furiosum	?																		160-173	1C
**T. australiensis	x																		90-180	1E
**T. paripaoninum	x																		394-530	1B
T. spheniscus	x																		16-32	1B
T. aculeatum	x																		11-115	1C
**T. veroni	x																		40-119	1E
**T. macrosciara	x																		58-201	1E
<i>Placotrochus laevis</i>	x																		9-90	1B
** <i>Javania lamproticum</i>	x																		200-201	1B
<i>Rhizotrochus tuberculatus</i>	x																		1-2	3A
** <i>Polymyces wellsi</i>	x																		400-420	1A
** <i>Gardineria havaitiensis</i>	x																		304-400	1C
** <i>C. philippinensis</i>	x																		220-224	1C
DENDROPHYLLIDAE																				
** <i>Balanophyllia carinata</i>	x																		112-124	1B
<i>Balanophyllia imperialis</i>	x																		100-150	1C
** <i>B. gigas</i>	x																		260-352	1C
** <i>B. cornu</i>	x																		150-404	1C
** <i>B. generatrix</i>	x																		298-530	1C
<i>Endopachys grayi</i>	x																		128-150	1A
** <i>E. bulbosa</i>	x																		220-224	1C
<i>Nolophyllia recta</i>	x																		40-51	3A
<i>N. piscanuda</i>	x																		22-51	3A
<i>Heteropsammia cochlea</i>	x																		9-137	1B
^ <i>Leptopsammia columna</i>	x																		20	1E
** <i>Rhizopsammia verrilli</i>	x																		2-38	1A
** <i>Dendrophyllia alcocki</i>	x																		296-298	1B
** <i>D. arbuscula</i>	x																		2-49	1B
** <i>D. boscmaui</i>	x																		200-201	-
<i>Tubastraea coccinea</i>	x																		0.3-20	2A
* <i>T. diaphana</i>	x																		0-30	2A
* <i>T. micranthus</i>	x																		6-10	1B
Totals:	41	74	41	22	87	26	19	12	15	27	5	7								

Distribution regions: 1, tropical Indian Ocean; 2, tropical Western Pacific (Indonesia, Philippines, Ryukyu Islands); 3, Northern Territory and/or Queensland; 4, northwestern Western Australia (Northern Australian Tropical provinces: Joseph Bonaparte Gulf south to Houtman Abrolhos Islands); 5, warm temperate southwestern Western Australia (south of Houtman Abrolhos Islands to Eucla); 6, South Australia (warm temperate); 7, New South Wales (warm temperate); 8, Victoria and/or Tasmania (warm to cold temperate); 9, Kermadec and/or Norfolk Islands (tropical); 10, eastern Pacific; 11, Atlantic Ocean.

The specimens on which this study was based originated primarily from the collections of the Western Australian Museum; however, additional Western Australian corals were studied from the NTM, SAM, NMV, AMS, and NMNH. In addition, the historical collection reported by Folkson (1919) was borrowed from the SMNH. Approximately 1725 specimens from 333 stations (many listed in Appendix) were used in the study. From this material, additional specimens of 98 of the 105 known Western Australian azooxanthellate species were obtained (Table 1). Seventy of the 105 species known from Western Australia are new records for the state (Table 1, * and **), 57 of which are new records for Australia (Table 1, **).

Synonymies are intended to be complete only for Australian records; otherwise, a reference is included that contains a description of the species and a fuller synonymy. Only new and previously poorly-known species are described and figured, as well as those that show unusual variation or are of doubtful identity. The scanning electron photomicrographs were taken by the author on an Hitachi S-570. In cases in which specimens lacked sufficient contrast for conventional photography, the corallum was stained with black cloth dye and coated with a thin layer of sublimed ammonium chloride.

A station list to all specimens reported follows the Reference section, except for localities listed as "other records" in the species accounts, which are given in full where listed.

ZOOGEOGRAPHY/DISTRIBUTION

Many authors (summarized in Wilson and Allen 1987; Morgan and Wells 1991) now recognize two marine biogeographic provinces for Western Australia: a Northern Australian Tropical Province and a Southern Australian Warm Temperate Province, with a broad overlap zone extending from North West Cape to as far south as Rottneest Island or even Cape Leeuwin. In a comprehensive analysis of shallow-water reef corals, Veron and Marsh (1988) and Veron (1995) suggested that the southern boundary of the tropical coral province extends to the Houtman Abrolhos Islands offshore but slightly more northerly on the mainland, i.e. Port Gregory. This cross shelf discrepancy is due to the offshore position of the warm, southward flowing Leeuwin Current and the coastal position of the colder, northward flowing Leeuwin Countercurrent (Hutchins 1994: 32). Veron (1993 and 1995) has shown that the number of reef corals dramatically drops from 201 at the Houtman Abrolhos Islands to 36 or less at and south of Port Gregory. It is acknowledged that many of the Western Australian azooxanthellate corals (which have a depth range of 0–1011 m, 46 of which are

found exclusively deeper than 200 m) are outside the influence of the Leeuwin Current are thus not subject to the same physical conditions as the inshore benthic fauna on which most zoogeographic conclusions have been based. And, according to Wilson and Allen (1987:43): "There is very little information available on the benthic fauna of the continental shelf and beyond". Nonetheless, the distributional patterns and affinities of azooxanthellate corals are remarkably similar to those of shallow-water faunas, as shown below. For the purpose of scoring Tables 1–2 and further zoogeographic discussion, the boundaries between the tropical and warm temperate provinces suggested by Veron and Marsh (1988) are used: the Houtman Abrolhos Islands (offshore) and Port Gregory (coastal).

Tropical West Australian Fauna.—As reviewed by Wilson and Allen (1987) and Morgan and Wells (1991), the northwestern coast of Western Australia is one of the southern extensions of the large Indo-West Pacific tropical realm. Of the 105 Western Australian azooxanthellate species, 87 (Table 1: column 4) are known from the Northern Australian Tropical Province, 69 (Table 2: patterns 1A–E) of which are considered to be restricted to tropical

Table 2 Categorization of Distribution Patterns and Number of Species among the Western Australian Azooxanthellate Scleractinia. Species characterizations listed in Table 1 (Four species not scored).

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1. Species restricted to tropical regions (69 species):
 - A. Circumtropical in distribution or very widespread, including Indo-West Pacific and eastern Pacific and sometimes Atlantic Ocean: 6 species.
 - B. Found throughout tropical Indo-West Pacific, sometimes including the Ryukyu Islands, Kermadec and Norfolk Islands, Northern Territory and Queensland, and sometimes Hawaiian Islands: 23 species.
 - C. Found throughout Western Pacific: 29 species.
 - D. Amphi-Indian Ocean: 2 species.
 - E. Endemic to Western Australia (Northern Australian Tropical Province): 9 species.
 2. Species that occur in tropical and warm temperate regions (20 species):
 - A. Species with a distribution beyond that of Western Australia: 19 species.
 - B. Endemic to western coast of Western Australia: 1 species.
 3. Species endemic to temperate regions (12 species):
 - A. Temperate southern Australia only (Southern Australian Warm Temperate Province): 11 species.
 - B. Temperate southern Australia and South Africa: 1 species.
-

regions. These tropical species are subdivided into categories 1 A–E in Table 2, in order to show the extent of the distributions of these species in tropical areas beyond Western Australia. Nine species (9/87 = 10%), category 1E of Table 2, are endemic to this province, which is consistent with the degree of endemism of other benthic invertebrates groups (i.e., molluscs, brachyuran decapods, echinoderms), summarized by Morgan and Wells (1991), as 10–17%. There is a general correlation between depth of occurrence and endemism among the nine endemic species (Table 3: pattern 1E), 7 of the 9 endemic species (78%) being found at shallow depths (0–200 m), whereas only 48% (38/79 species of categories 1A–D, 2A of Table 3) of the more widespread tropical species are found at depths shallower than 200 m.

Another category of "tropical" species (patterns 2 A and B of Table 2) are those azooxanthellate species that occur both in tropical and temperate Western Australian regions, most of which occur not only in the tropical realm but also off warm temperate South Australia, Victoria, Tasmania, New South Wales, and/or Japan. Nineteen species have such distributions (Tables 1–2, pattern 2A), even though in some cases these species may not yet have been recorded from the tropical region of Western Australia (e.g., *Desmophyllum dianthus* and *Solenosmilia variabilis*) or the warm temperate region of Western Australia (e.g., *Paracontrochus zaidleri*, *Guynia annulata*, and *Flabellum hoffmeisteri*). In general, these species occur deeper than the exclusively tropical species (Table 3), 68% of the 19 species occurring exclusively deeper than 200 m. One species, *Rhizosmilia multipalifera*, categorized as having pattern 2B, occurs from Cape Jaubert to 31°30'S latitude, and is thus far endemic to the western coast of Western Australia. Not surprisingly, it has a relatively shallow depth range.

As previously suggested, the number of tropical azooxanthellate species gradually attenuates with increasing southern latitude. Comprehensive numbers of species for various regions along the coast, such as those provided by Morgan and Wells (1991) for Crustacea, Veron and Marsh (1988) for corals, and Wells (1980) for molluscs, are not available for deep-water corals. To a certain degree our knowledge of the deep-water coral distributional ranges is a reflection of the regions and depths at which dredging vessels happened to make stations. Nonetheless, a preliminary tabulation can be given of the southern limit of the tropical species (Tables 2–3, categories 1 and 2) for which adequate data are available. For instance, of the species known from Western Australia, eight extend no farther south than the region defined by Browse, Scott, and Cartier Islands, 5 extend to Dampier Land, 5 to Rowley Shoals and Cape

Jaubert, 37 to the continental slope between Rowley Shoals and Port Hedland, 13 to Dampier Archipelago, 4 to the Cape Range/North West Cape region, 4 to Shark Bay, 5 to the Houtman Abrolhos Islands, 6 to Rottneest Island, one (*Conocyathus zelandiae*) to King George Sound, one (*Cyathelia axillaris*) to Esperance, and 3 (*Culicia australiensis*, *Conotrochus funiculumna*, and *Cyathotrochus pileus*) to the Great Australian Bight near Eucla. Thus the highest attrition rate of tropical species (50 species) appears to be the region between Cape Jaubert (coastal)–Rowley Shoals (oceanic) to Dampier Archipelago (coastal)–Glomar Shoal (oceanic).

Temperate West Australian Fauna.—Of the 26 azooxanthellate species that occur in the Southern Australian Warm Temperate Province (Table 1, column 5), 11 (11/26 = 42%) are endemic to this region. According to Morgan and Wells (1991), endemism of shallow water benthic invertebrates and fish for this region is usually much higher (e.g., 63–95%); however, this discrepancy can be partially explained by the fact that whereas 10 of the 11 warm temperate endemics are shallow in distribution (Table 3), only 8 of the 15 non-endemic species occur in shallow water, the other 7 species being found deeper than 200 m and thus having the potential for a broader geographic range. Of these 11 endemic temperate species: 4 can be categorized as having a "Southeastern Australian" pattern (sensu Wilson and Allen 1987), being found only marginally off southeastern Western Australia in the Great Australian Bight; 5 extend to Albany/King George Sound region ("endemic south coast" pattern of Wilson and Allen 1987); and 2 species (i.e., *Trematotrochus verconis*, and *Rhizotrochus*

Table 3 General Bathymetric Ranges of Western Australian Azooxanthellate Species in relation to Distribution Pattern (see Table 1).

	0–200 m (shelf)	Intermediate (shelf+slope)	> 200 m (slope)
TROPICAL			
1A (Widespread)	3	0	3
1B (IWP)	14	1	8
1C (W. Pacific)	9	4	16
1D (Amphi-Indian)	1	0	1
1E (Endemic)	7	0	2
TROPICAL and TEMPERATE			
2A (Widespread)	5	1	13
2B (Endemic)	1	0	0
ENDEMIC TEMPERATE			
3A (southern Australia)	10	0	1
3B (s. Australia and S. Africa)	0	0	1
Unclassified	3	0	1
TOTAL:	53	6	46

tuberculatus) extend to the Houtman Abrolhos Islands ("Southwestern Australian" pattern of Wilson and Allen, 1987).

Four species were not categorized because of their unusually disjunct distributions: *Letepsammia fissilis*, *Cyathelia axillaris*, *Crispatotrochus inornatus*, and *Dendrophyllia boschmai*.

**Check List of Western Australian
Azooxanthellate Scleractinia**

Order Scleractinia

Suborder Fungiina

Superfamily Fungioidea Dana, 1846

Family FUNGIACYATHIDAE, Chevalier 1987

Fungiacyathus (*F.*) *stephanus* (Alcock, 1893)

F. (*F.*) *fragilis* Sars, 1872

F. (*F.*) *paliferus* (Alcock, 1902)

F. (*F.*) *multicarinatus* sp. nov.

F. (*Bathyactis*) *variegatus* Cairns, 1989

F. (*B.*) *granulosus* Cairns, 1989

Family MICRABACIIDAE Vaughan, 1905

Letepsammia formosissima (Moseley, 1876)

L. fissilis Cairns, 1995

Rhombopsammia niphada Owens, 1986

Stephanophyllia complicata Moseley, 1876

Suborder Faviina

Family RHIZANGIIDAE d'Orbigny, 1851

Culicia australiensis Hoffmeister, 1933

C. hoffmeisteri Squires, 1966

Astrangia atrata (Dennant, 1906)

Oulangia stokesiana Milne Edwards and Haime, 1848

Family Oculinidae Gray, 1847 OCULINIDAE

Madrepora oculata Linnaeus, 1758

Cyathelia axillaris (Ellis and Solander, 1786)

Family ANTHEMIPHYLLIIDAE Vaughan, 1907

Anthemiphyllia dentata (Alcock, 1902)

Suborder Caryophylliina

Superfamily Caryophylloidea Dana, 1846

Family CARYOPHYLLIIDAE Dana, 1846

Caryophyllia (*C.*) *transversalis* Moseley, 1881

C. (*C.*) *rugosa* Moseley, 1881

C. (*C.*) *quadrageraria* Alcock, 1902

C. (*C.*) *stellula* sp. nov.

C. (*C.*) *atlantica* (Duncan, 1873)

C. (*C.*) *grandis* Gardiner and Waugh, 1938

C. (*Acanthocyathus*) *grayi* (Milne Edwards and Haime, 1848)

C. (*A.*) *unicristata* Cairns and Zibrowius, 1997

C. (*A.*) *decamera* sp. nov.

Crispatotrochus rugosus Cairns, 1995

C. inornatus Tenison Woods, 1878

Oxysmilia circularis sp. nov.

Trochocyathus philippincensis Semper, 1872

T. apertus Cairns and Zibrowius, 1997

Paracyathus rotundatus Semper, 1848

P. ?fulvus Alcock, 1893

Stephanocyathus (*Acinocyathus*) *spiniger* (Marenzeller, 1888)

S. (*A.*) *explanans* (Marenzeller, 1904)

Deltocyathus magnificus Moseley, 1876

D. suluensis Alcock, 1902

D. sarsi (Gardiner and Waugh, 1938)

Heterocyathus aequicostatus Milne Edwards and Haime, 1848

H. alternatus Verrill, 1865

H. sulcatus (Verrill, 1866)

H. hemisphaericus Gray, 1849

Conotrochus funiculumina (Alcock, 1902)

Paraconotrochus zeidleri Cairns and Parker, 1992

Desmophyllum dianthus (Esper, 1794)

Thalamophyllia tenuescens (Gardiner, 1899)

Asterosmilia marchadi (Chevalier, 1966)

"*Rhizosmilia*" *mutipalifera* sp. nov.

Solenosmilia variabilis Duncan, 1873

Family TURBINOLIIDAE Milne Edwards and Haime, 1848

Trematotrochus verconis Dennant, 1904

T. alternans Cairns and Parker, 1992

Conocyathus zelandiac Duncan, 1876

C. gracilis sp. nov.

Alatotrochus rubescens (Moseley, 1876)

Platyatrochus laevigatus Cairns and Parker, 1992

P. hastatus Dennant, 1902

Idiotrochus kikutii (Yabe and Eguchi, 1941)

Notocyathus venustus (Alcock, 1902)

Tropidocyathus lessonii (Michelin, 1842)

"*T.*" *labidus* Cairns and Zibrowius, 1997

Cyathotrochus pileus (Alcock, 1902)

Australocyathus vincentinus (Dennant, 1904)

Deltocyathoides orientalis (Duncan, 1876)

Superfamily Flabelloidea Bourne, 1905

Family GUYNIIDAE Hickson, 1910

Guynia annulata Duncan, 1872

Family FLABELLIDAE Bourne, 1905

Flabellum (*F.*) *magnificum* Marenzeller, 1904

F. (*F.*) *lamellosum* Alcock, 1902

F. (*F.*) *patens* Moseley, 1881

F. (*F.*) *folkesoni* sp. nov.

F. (*F.*) *politum* Cairns, 1989

F. (*Ullocyathus*) *hoffmeisteri* Cairns and Parker, 1992

F. (*U.*) *tuthilli* Hoffmeister, 1933

F. (*U.*) *marenzelleri* Cairns, 1989

F. (*U.*) *deludens* Marenzeller, 1904

Truncatoflabellum angiosomum (Folkeson, 1919)

T. formosum Cairns, 1989

T. australiensis sp. nov.

T. paripavoninum (Alcock, 1894)

T. spleniciscus (Dana, 1846)

T. aculcatum (Milne Edwards and Haime, 1848)

T. veroni sp. nov.

T. macroeschara sp. nov.

- Placotrochus laevis* Milne Edwards and Haime, 1848
Javania lamprotichum (Moseley, 1880)
Rhizotrochus tuberculatus (Tenison Woods, 1878)
Polymyces wellsi Cairns, 1991
Gardineria hawaiiensis Vaughan, 1907
G. philippinensis Cairns, 1989

Suborder Dendrophylliina

Family DENDROPHYLLIIDAE Gray, 1847

- Balanophyllia carinata* (Semper, 1872)
B. imperialis Kent, 1871
B. gigas Moseley, 1881
B. cornu Moseley, 1881
B. generatrix Cairns and Zibrowius, 1997
Endopachys grayi Milne Edwards and Haime, 1848
E. bulbosa Cairns and Zibrowius, 1997
Notophyllia recta Dennant, 1906
N. piscacauda sp. nov.
Heteropsammia cochlea (Spengler, 1781)
Leptopsammia columna Folkesson, 1919
Rhizopsammia verrilli van der Horst, 1922
Dendrophyllia alcocki (Wells, 1954)
D. arbuscula van der Horst, 1922
D. boschniai van der Horst, 1926
Tubastraea coccinea Lesson, 1829
T. diaphana (Dana, 1846)
T. micranthus (Ehrenberg, 1834)

SYSTEMATICS

Order Scleractinia

Suborder Fungiina

Superfamily Fungioidea Dana, 1846

Family Fungiacyathidae Chevalier, 1987

Genus *Fungiacyathus* Sars, 1872

Subgenus *Fungiacyathus* Sars, 1872

Fungiacyathus (*F.*) *stephanus* (Alcock, 1893)

Bathyactis stephanus Alcock, 1893: 149, pl. 5, figs. 12, 12a.

Fungiacyathus (*F.*) *stephanus* – Cairns, 1989: 7–9, pl. 1, figs. a–k, pl. 2, figs. a–b (synonymy and description); 1995: 31–32, pl. 1, figs. a–c.—Cairns and Zibrowius, 1997: 68–69.

New Records

Soela: stn 02/82/19, 1 concave, WAM 300–88; stn 02/82/22, 1 concave, WAM 25–83; stn 02/82/26, 1 concave, WAM 32–83; stn 02/82/27, 1 concave, WAM 479–96; stn 02/82/31, 2 concave, USNM 97800; stn 02/82/34, 2 concave, WAM 30–83; stn 02/82/40, 1 flat, WAM 37–83; stn 01/84/64, 10 flat, WAM 767–84; stn 01/84/67, 11 flat: 8 (WAM 724–84), 3 (USNM 97801).

Courageous: stn 003, 2 concave, WAM 427–96; stn 020, 1 flat, WAM 66–84.

Remarks

Two forms of this species were described by Cairns and Zibrowius (1997), one having a flat base, the other a concave base (see New Records). Off Western Australia the flat-based form was found at a shallower depth (304–450 m) than the concave-based form (452–720 m).

Distribution

Western Australia: continental slope of northwestern coast from south of Scott Reef to Port Hedland; 304–720 m; 8.4°–10.7°C; always reported on a soft/mud substrate. Elsewhere: Indo-West Pacific (widespread from southwestern Indian Ocean to Kermadec Ridge, including Japan); 245–2000 m (Cairns and Zibrowius 1997).

Fungiacyathus (*F.*) *fragilis* Sars, 1872

Fungiacyathus fragilis Sars, 1872: 58, pl. 5, figs. 24–32.—Cairns, 1982: 7, pl. 1, figs. 3–7 (synonymy); 1995: 32, pl. 1, figs. d–f (synonymy); in press, Table 3.

New Records

Lady: stn RW96–29, 1, NTM C8088; stn RW96–31, 1, NTM C8091.

Remarks

Fungiacyathus fragilis is similar to the previous species but can be distinguished by lacking paliform lobes (P2) and having much lower septal lobes. It is compared to all other species in the subgenus by Cairns (in press, Table 3). The specimen from *Lady* stn RW96–31 is 52 mm in calicular diameter, the largest known corallum of this species.

Distribution

Western Australia: continental slope of northwestern coast between Browse and Cartier Islands; 400–420 m. Elsewhere: cold temperate New Zealand; cold temperate North Atlantic; Hawaiian Islands; 285–2200 m (Cairns 1995).

Fungiacyathus (*F.*) *paliferus* (Alcock, 1902a)

Bathyactis palifera Alcock, 1902a: 108; 1902c: 38, pl. 5, figs. 34, 34a.—Hoffmeister, 1933: 14, pl. 4, fig. 6.

Fungiacyathus (*F.*) *paliferus* – Cairns, 1989: 9–10, pl. 2, figs. c–i, pl. 3, figs. a–c (synonymy and description).—Cairns and Parker, 1992: 6–7, pl. 1, figs. a–b.—Cairns and Zibrowius, 1997: 69–70.

New Records

Soela: stn 1/79/unnumbered, 2 irregular fragments, WAM 33–85; stn 1/79/18, 1, USNM

97802; stn 02/82/13A, 1 irregular fragment, WAM 478–96.

Umataka Maru: stn 6291, 2 irregular fragments, WAM 428–96.

Lady: stn RW96–17, 1, NTM C8071.

Remarks

This species is also known to occur in two growth forms: relatively large (GCD over 2 cm), complete coralla, and as irregularly-shaped (often semi-circular) regenerative fragments less than 1 cm in GCD (Cairns 1994). Three of the lots reported are irregular fragments, one of the other two (i.e., *Soela* 1/79/18) being one of the largest known specimens, having a GCD of 25.1 mm.

Distribution

Western Australia: continental shelf of northwestern coast from Cartier Island to west of Glomar Shoal; 101–300 m. Elsewhere: Indo-West Pacific (southwestern Indian Ocean to Japan, including Great Australian Bight (western South Australia)); 69–823 m (Cairns and Zibrowius 1997).

Fungiacyathus (*F.*) *multicarinatus* sp. nov.

Figure 1 a–c

Records

Soela: stn 01/84/54, holotype, WAM 547–84.

Description

Corallum circular, but eccentric, caused by regeneration from a parent fragment that composes about one-third of corallum; GCD = 25.9 mm. Base undulating, also due to regeneration. Costae finely dentate, low ridges. Septa hexamerally arranged in five cycles; all septa planar, with straight upper edges. S1 bear 30–34 trabecular carinae on each face, sometimes aligned on either side of a septum, but usually not. Septal carinae quite tall, up to 0.4 mm, filling most of interseptal regions and obscuring view of corallum base and synapticalae. Innermost trabecular carinae produced into spatulate spines that arch toward and slightly over the columella. Middle and outer trabecular carinae grouped into upward projecting spines of 2 or 4 trabeculae apiece. S2 similar to S1 but slightly smaller. S3 similar to S2 but slightly less tall and composed of only 24–26 trabecular per septal face. Inner edges of S1–3 extend to columella. S4 bear only 16–18 trabecular carinae per face, fusing to their adjacent S3 about two-thirds distance to columella. S5 rudimentary, composed of only 5–7 trabecular carinae per septal face, merging with their common S4 about half distance to columella. No septal canopies; no pali or paliform lobes. Synapticalae small and poorly developed. Columella papillose.

Remarks

This subgenus consists of five Recent species: *F. pusillus* (Pourtales, 1868); *F. fragilis* Sars, 1872; *F. stephanus* (Alcock, 1893); *F. paliferus* (Alcock, 1902a); and *F. sp.* A sensu Cairns, 1994. *F. multicarinatus* differs from these species in having more numerous and much taller trabecular carinae, and poorly developed synapticalae. Although represented by only one specimen, it would appear to be a species that reproduces by asexual fragmentation, a mode consistent with its poorly developed synapticalae.

Distribution

Western Australia: continental slope off Dampier Land; 348–350 m.

Etymology

The species name *multicarinatus* (Latin *multus*, many + *carinatus*, keeled, carinate) alludes to the numerous trabecular carinae on the face of each septum, more than in any other species in the genus.

Subgenus *Bathlyactis* Moseley, 1881

Fungiacyathus (*B.*) *variegatus* Cairns, 1989

Fungiacyathus (*B.*) *variegatus* Cairns, 1989: 11–12, pl. 5, figs. a–h; 1994: 38–39, pl. 15, figs. a–b.—Cairns and Zibrowius, 1997: 71–72.

New Records

Soela: stn 01/84/65, 2, WAM 1020–85.

Umataka Maru: stn 6921, 1, WAM 148–84.

Distribution

Western Australia: continental slope of northwestern coast south of Scott Reef and south of Rowley Shoals; 300–302 m. Elsewhere: western Pacific from Ryukyu Islands through Indonesia; 84–715 m (Zibrowius and Cairns, 1997).

Fungiacyathus (*B.*) *granulosus* Cairns, 1989

Fungiacyathus (*B.*) *granulosus* Cairns, 1989: 11, pl. 4, figs. d–i; 1994: 39, pl. 15, figs. d–e.—Cairns and Zibrowius 1997: 71.

New Records

Soela: stn 01/84/65, 8: 5 (WAM 768–84), 3 (USNM 97803); stn 01/84/66, 3, WAM 741–84; stn 01/84/67, 5, WAM 429–96; stn 01/84/77, 1, WAM 526–84; stn 01/84/122, 1, WAM 794–84.

Courageous: stn 002, 2, WAM 452–96; stn 004, 1, USNM 97804.

Distribution

Western Australia: continental slope of

northwestern coast off Seringapatam Reef to south of Rowley Shoals; 302–400 m on exclusively soft, muddy substrates. Elsewhere: western Pacific from Ryukyu Islands through Indonesia; 287–640 m (Cairns and Zibrowius 1997).

Family Micrabaciidae Vaughan, 1905

Genus *Letepsammia* Yabe and Eguchi, 1932

Letepsammia formosissima (Moseley, 1876)

Stephanophyllia formosissima Moseley, 1876: 561–562.

Letepsammia formosissima – Cairns, 1989: 15–18, pl. 6, fig. j, pl. 7, figs. g–i, pl. 8, figs. a–d (synonymy and description).—Cairns and Parker, 1992: 8–9, pl. 1, figs. f, h.—Cairns and Keller, 1993: 230–231, pl. 3, fig. D.—Cairns, 1995: 36–37, pl. 3, figs. f–g.—Cairns and Zibrowius, 1997: 73–75.

New Records

Soela: stn 01/84/51, 2, WAM 542–84; stn 01/84/56, 1, WAM 566–84; stn 01/84/116, 4: 2 (WAM 697–84), 2 (USNM 97805); stn 01/84/118, 1, WAM 779–84; stn 01/84/121, 2, WAM 789–84.

Umataka Maru: stn 6922, 1, WAM 1022–85.

Distribution

Western Australia: continental slope of northwestern coast from Dampier Land to southwest of Rowley Shoals; 302–500 m on soft, muddy substrates. Elsewhere: widespread, from southwestern Indian Ocean to Hawaiian Islands, including South China Sea, Philippines, Indonesia, Norfolk and Kermadec Ridges, and southeastern Australia; 97–457 m (Cairns and Parker 1992; Cairns 1995; Cairns and Zibrowius 1997).

Letepsammia fissilis Cairns, 1995

Letepsammia fissilis Cairns, 1995: 35–36, pl. 3, figs. a–e.

New Record

Soela: stn 02/82/13A, 1, WAM 89–84.

Distribution

Western Australia: southwest of Rowley Shoals; 201 m. Elsewhere: New Zealand region (northern North Island and Norfolk Ridge); 106–206 m.

Genus *Rhombopsammia* Owens, 1986

Rhombopsammia niphada Owens, 1986

Rhombopsammia niphada Owens, 1986: 252–255, figs. 2b, 3a–d.—Cairns, 1989: 19–20, pl. 9, figs. d–j, text-fig. 2 (synonymy and description); 1994: 41,

pl. 15, figs. i–k, pl. 16, fig. e.—Cairns and Zibrowius, 1997: 75–76.

New Records

Soela: stn 02/82/19, 1, WAM 22–83; stn 02/82/27, 1, WAM 34–83; stn 01/84/51, 2, WAM 430–96; stn 01/84/77, 6: 3 (WAM 522–84), 3 (USNM 97806); stn 01/84/81, 1, WAM 672–84; stn 01/84/120, 1, WAM 431–96; stn 01/84/121, 1, WAM 790–84.

Distribution

Western Australia: continental slope of northwestern coast from Cartier Island to Port Hedland; 390–696 m on soft, muddy substrates. Elsewhere: western Pacific from Japan through Indonesia; 405–804 m (Cairns and Zibrowius 1997).

Genus *Stephanophyllia* Michelin, 1841

Stephanophyllia complicata Moseley, 1876

Stephanophyllia complicata Moseley, 1876: 558–561, text-fig.—Cairns, 1989: 21, pl. 12, figs. a–b; 1995: 37–38, pl. 3, fig. h, pl. 4, figs. a–e (synonymy and description).—Cairns and Zibrowius, 1997: 77–78.

New Records

Soela: stn 01/84/99, 2, USNM 97807; stn 01/84/100, 1, WAM 690–84; stn 01/84/102, 1, WAM 771–84; stn 01/84/105, 3, WAM 786–84; stn 01/84/109, 2, WAM 692–84; stn 01/84/112, 1, USNM 97808.

Umataka Maru: stn 6920, 3, WAM 131–84; stn 6921, 4, WAM 152–84; stn 6922, 1, WAM 1023–85; stn 6926, 1, WAM 100–84; stn 6930, 1, WAM 252–93.

Diamantina: stn 186, 1, WAM 155–83.

Remarks

The largest corallum known of this species is from Western Australia (*Soela* stn 01/84/112), measuring 23.8 mm in calicular diameter.

Distribution

Western Australia: continental slope of northwestern coast from near Browse Island to Cape Farquhar, but most records reported above from Rowley Shoals; 260–433 m on soft substrates. Elsewhere: western Indian Ocean; Banda Sea; Norfolk and Three Kings Ridge; 210–1137 m (Cairns and Zibrowius 1997).

Suborder Faviina

Family Rhizangiidae d'Orbigny, 1851

Genus *Culicia* Dana, 1848

Culicia australiensis Hoffmeister, 1933

Culicia australiensis Hoffmeister, 1933: 12, pl. 3, figs. 3–4.—Cairns and Parker, 1992: 12–13, pl. 2, figs. a, d, g (synonymy and description).

Culicia sp. Veron, 1986: 600, black and white fig.

New Records

Soela: stn 05/82/55, 2, WAM 72–83.

Franklin: stn GAB033, 3, SAM H874.

Kummunya: stn BG141, 2, NTM C8032.

Comet: 33°17'S, 128°12'E, 180 m, 13 I 1989, 2, SAM H868.

Other records: Flying Fish Cove, Christmas Island, 0–3 m, 22 II 1987, 1, WAM 614–87; 13°56'S, 125°37'E (Cassini Island, Kimberley), "SCUBA" depth, 18 VIII 1991, 1, WAM 147–91 (attached to base of *Rhizopsammia verrilli*); North Mole, Fremantle Harbour, 25 XI 1983, 1, USNM 97809; Geographe Bay, Dunsborough, 18 m, 26 I 1978, 4, WAM 311–78;

Distribution

Western Australia: entire coastline; 18–180 m. Elsewhere: South Australia (Cairns and Parker 1992); Peron Islands, Northern Territory (reported herein); Christmas Island; 3–238 m.

Culicia hoffmeisteri Squires, 1966

Culicia hoffmeisteri Squires, 1966: 171–172, pl. 1, fig.

3.—Cairns and Parker, 1992: 13–14, pl. 3, figs. a–d (synonymy and description).

New Record

Frenchman Bay, Albany, Western Australia (35°05'S, 117°57'E), 0–10 m, 17 XII 1982, 1 colony, NMV F78388.

Distribution

Western Australia: continental shelf off Albany; 0–10 m. Elsewhere: South Australia; 0–29 m (Cairns and Parker 1992).

Genus *Astrangia* Milne Edwards and Haime, 1848d

Astrangia atrata (Dennant, 1906)

Dendrophyllia atrata Dennant, 1906: 163–165, pl. 6, figs. 5a–b.

Astrangia atrata – Cairns and Parker, 1992: 14, figs. 3e–g (synonymy and description).

New Record

Franklin: stn GAB 063, 1 colony, SAM H869.

Distribution

Western Australia: known only from Great Australian Bight off Point Culver; 46 m. Elsewhere: southeastern Australia (New South Wales to South Australia); 9–40 m (Cairns and Parker 1992).

Genus *Oulangia* Milne Edwards and Haime, 1848c

Oulangia stokesiana stokesiana Milne Edwards and Haime, 1848c Figure 1 d–e

Oulangia stokesiana Milne Edwards and Haime, 1848c: pl. 7, figs. 4, 4a; 1849:183; 1850b: xiv.—Faustino, 1927: 111 (translation of original description).

?*Qulangia* (*sic*) *stokesiana* – Zou, 1988: 78, pl. 4, figs. 1–3.

New Records

Kummunya: stn BG69, 3, NTM C8018.

Other records: Black Rocks area, north of Derby, King Sound, intertidal, X 1975, 1, WAM 153–83

Remarks

This rarely reported species is known only from the holotype, which is probably lost (Milne Edwards and Haime 1860: 108), and specimens reported by Zou (1988), which are doubtful in identification. The Western Australian specimen figured below agrees well with the original description except for being slightly smaller (9.6 × 7.1 mm in calicular diameter, 6.8 mm in height, and 6.1 mm in pedicel diameter) and in having a uniform black-brown pigmentation on the calicular elements that extends to the theca within 1 mm from the calicular edge. It contains 96 septa: one half system lacks a pair of S5 and another has a pair of S6.

The other subspecies, *Oulangia stokesiana miltoni*, described by Yabe and Eguchi (1932), is known from Japan and South Korea (Cairns, 1994).

Distribution

Western Australia: King Sound, Kimberley; intertidal reef rock. Elsewhere: Fog Bay, Northern Territory (reported herein); Philippines; ?South China Sea (Zou 1988); 1–6 m.

Family Oculinidae Gray, 1847

Genus *Madrepora* Linnaeus, 1758

Madrepora oculata Linnaeus, 1758 Figure 1 f–i

Madrepora oculata Linnaeus, 1758: 798.—Cairns, 1994: 18–19, pl. 3, figs. f–h (synonymy and description).—Grygier and Cairns, 1997: 63–64, 68, figs. 1A–F.—Cairns and Zibrowius, 1997: 79–80.

Madrepora sp. Veron, 1986: 599, black and white fig.

New Records

Soela: stn 01/84/49, 1, WAM 765–84; stn 01/84/

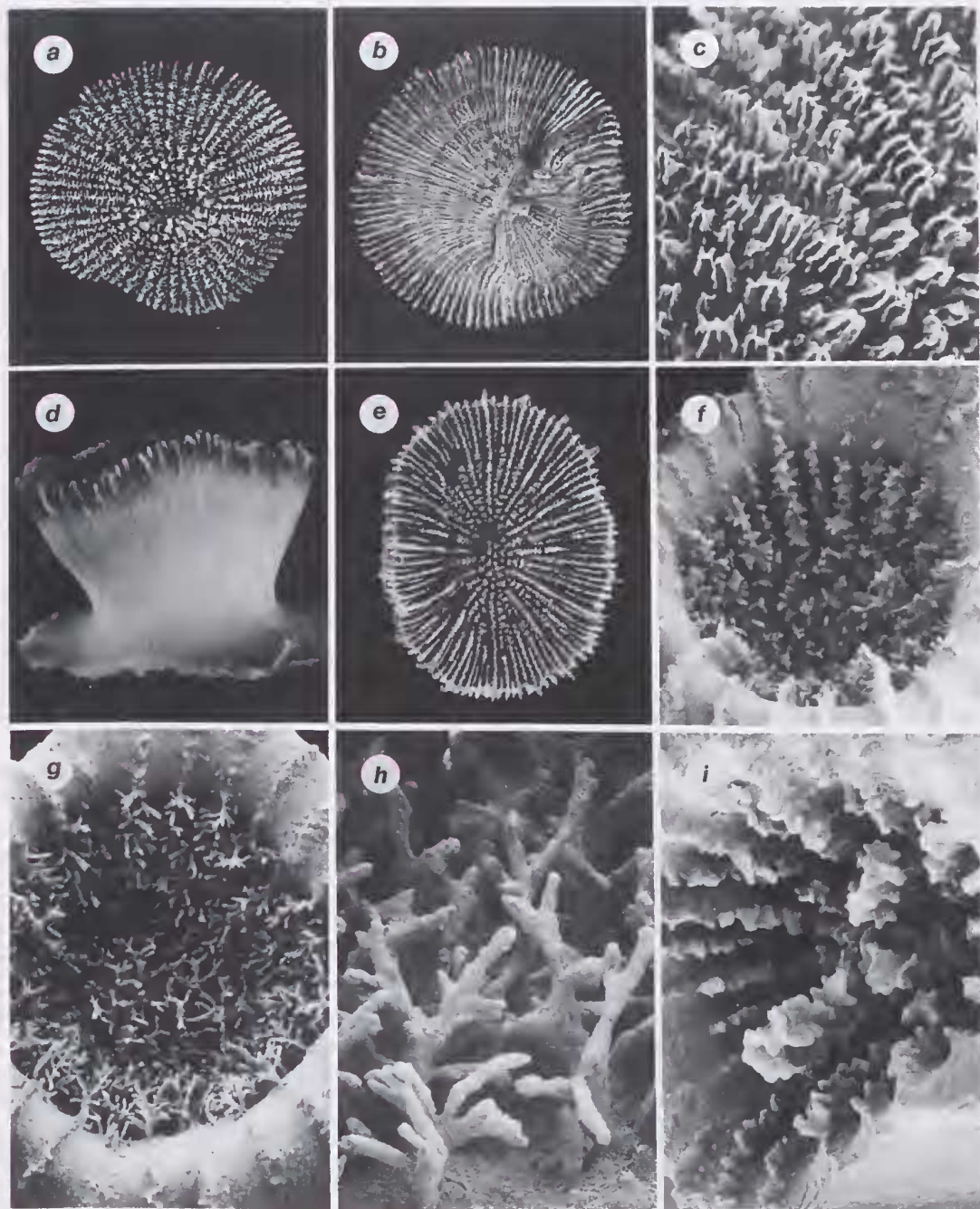


Figure 1 a-c, *Fungiacyathus multicarinatus*, holotype: a-b, calicular and basal views, $\times 1.68$; c, detail of highly ridged septal faces, $\times 7.9$. d-e, *Oulangia stokesiana*, Derby, King Sound, WAM 152-83, side and calicular views, $\times 5.1$. f-i, *Madrepora oculata*: f, typical corallite, *Soela* stn 01/84/52, USNM 97811, $\times 34$; g-h, corallite with highly modified, spinose septa, *Soela* stn 01/84/107, WAM 733-84, $\times 30$, $\times 140$, respectively; i, corallite with asymmetrically developed P2, *Soela* stn 01/84/99, WAM 755-84, $\times 42$.

51, *2, WAM 801-84; stn 01/84/52, *3: 2 (WAM 544-84), 1, including SEM stub 853 (USNM 97811); stn 01/84/54, 5, WAM 551-84; stn 01/84/64, 1, WAM 583-84; stn 01/84/67, 1, WAM 669-84; stn 01/84/70, 5, WAM 530-84; stn 01/84/72, 1, WAM 795-84; stn 01/84/75, *1, WAM 787-84; stn 01/84/76, 1, WAM 799-84; stn 01/84/78, *6, USNM 97812; stn 01/84/80, *1, WAM 722-84; stn 01/84/81, *1, WAM 763-84; stn 01/84/82, 1, WAM 760-84; stn 01/84/82a, 1, WAM 750-84; stn 01/84/91, 1, WAM 751-84; stn 01/84/94, 2, WAM 725-84; stn 01/84/96, 2, WAM 753-84, and SEM stub 850 (USNM); stn 01/84/98, 1, WAM 772-84; stn 01/84/99, *3, WAM 755-84, and SEM stub 852 (USNM); stn 01/84/101, 1, WAM 726-84; stn 01/84/102, *1, WAM 770-84; stn 01/84/105, *3, WAM 734-84; stn 01/84/107, 1, WAM 733-84, and SEM stub 851 (USNM); stn 01/84/108, *3, USNM 97813; stn 01/84/109, *3, WAM 7-87, and SEM stub 849 (USNM); stn 01/84/111, 1, WAM 774-84; stn 01/84/112, *2, WAM 776-84; stn 01/84/113, 1, WAM 777-84; stn 01/84/118, *1, WAM 781-84.

Courageous: stn 004, 2, WAM 74-84; stn 013, 1, WAM 73-84; stn 015, 8: 4 (WAM 105-840), 4 (USNM 97810).

Remarks

Grygier and Cairns (1997) illustrated several extremely enlarged, highly modified corallites of Western Australian *M. oculata* that were caused by the infestation of petraroid ascothoracid crustaceans. The 12 Western Australian records cited by Grygier and Cairns (1997) are reiterated above, and constitute an infestation rate of 39.4% (13/33 lots listed above marked with an asterisk) of the lots known from Western Australia. However, even corallites not affected by parasites show great variation in calicular features. Some coralla have a deep fossa and no pali or columella, whereas others have a shallow fossa and well-developed P2 and columella (Figure 1f). Several coralla were noted to have asymmetrically developed P2, bearing 2 or 3 enlarged P2, the other P2 being rudimentary (Figure 1i). Still another corallum possessed several corallites in which the septal and columellar elements had been reduced to a thicket of elongate spines (Figure 1g-h). Those coralla in which the P2 and columella are well developed resemble the genus *Sclerhelia* Milne Edwards and Haime, 1850a; however, the P2 and columella are much more robust in that genus. Nonetheless, a revision of the Oculinidae may lead to the synonymy of *Sclerhelia* with *Madrepora* or, conversely, the splitting of the *Madrepora oculata* into several species.

Distribution

Western Australia: continental slope of northwestern coast from Cartier Island to

southwest of Rowley Shoals; 304-544 m, usually on a soft (mud) substrate. Elsewhere: virtually cosmopolitan, except for continental Antarctica and southern Australia; 15-1500 m (Cairns and Zibrowius 1997).

Genus *Cyathelia* Milne Edwards and Haime, 1849

Cyathelia axillaris (Ellis and Solander, 1786)

Madrepora axillaris Ellis and Solander, 1786: 153, pl. 13, fig. 5.

Cyathelia axillaris - Veron, 1986: 599, color and black and white figs.—Cairns, 1994: 43-44, pl. 18, figs. a-c (synonymy and description).—Cairns and Zibrowius, 1997: 84.

New Record

East side Thomas Island, Esperance, 9-12 m (back of cave), 6 III 1977, 1 large colony, WAM 623-79.

Remarks

This colony differs from those previously reported in having a completely white corallum, the others having a tan corallum with dark brown corallites. When alive, however, this colony was reported to have brown polyps. The Esperance specimen is the largest known corallum, measuring 15 cm tall and having a massive base 5.5 cm in diameter.

Distribution

Western Australia: Recherche Archipelago (Veron 1986) and Esperance; 12-40 m. Elsewhere: western Pacific from Japan through Indonesia; 13-366 m (Cairns and Zibrowius 1997).

Family *Anthemiphylliidae* Vaughan, 1907

Genus *Anthemiphyllia* Pourtalès, 1878

Anthemiphyllia dentata (Alcock, 1902a)

Discotrochus dentatus Alcock, 1902a: 104.

Anthemiphyllia dentata - Veron, 1986: 604, fig.—Cairns and Parker, 1992: 16-17, pl. 4, figs. e-f.—Cairns, 1995: 41-42, pl. 6, figs. c-g (synonymy and description).—Cairns and Zibrowius, 1997: 86.

New Records

Soela: stn 02/82/10A, 1, WAM 45-84; stn 02/82/13A, 2, WAM 78- and 91-84.

Lady: stn RW96-17, 1 NTM C8073.

Lady Basten: stn LB5(s), 2, WAM 32-96.

Distribution

Western Australia: Great Australian Bight, off

Eucla (Cairns and Parker 1992); off Port Hedland; south of Cartier Island; 154–240 m. Elsewhere: Indo-West Pacific (widespread from southwestern Indian Ocean to Japan, including Kermadecs and southeastern Australia); 50–570 m (Cairns and Zibrowius 1997).

Suborder Caryophylliina

Family Caryophylliidae Dana, 1846

Genus *Caryophyllia* Lamarck, 1801

Subgenus *Caryophyllia* Lamarck, 1801

Caryophyllia (*C.*) *transversalis* Moseley, 1881

Caryophyllia clavus var. *transversalis* Moseley, 1881: 134–135, pl. 1, figs. 2, 2a.

Caryophyllia (*C.*) *transversalis* – Cairns and Zibrowius 1997: 90–91, figs 6 f–h (description).

New Records

Soela: stn 01/84/74, 1, WAM 533–84; stn 01/84/78, 1, USNM 97814; stn 01/84/85, 2, WAM 683–84; stn 01/84/87, 1, WAM 685–84.

Umataka Maru: stn 6921, 3, WAM 154–84; stn 6930, 1, WAM 241–93.

Distribution

Western Australia: continental slope of northwestern coast from Browse Island to south of Rowley Shoals; 224–302 m. Elsewhere: Indonesia; 210–397 m (Cairns and Zibrowius 1997).

Caryophyllia (*C.*) *rugosa* Moseley, 1881

Caryophyllia rugosa Moseley, 1881: 141–143, pl. 1, figs. 8a–b.—Cairns, 1994: 47, pl. 20, fig. i, pl. 21, fig. a (synonymy and description); 1995: 43–44, pl. 6, fig. h, pl. 7, figs. a–c.—Cairns and Zibrowius, 1997: 91–92.

New Records

Soela: stn 05/82/36, 2: 1 (WAM 67–83), 1 (USNM 97815).

Lady Basten: stn LB7(s), 1, WAM 456–96.

Distribution

Western Australia: south of Rowley Shoals and off Port Hedland; 180–200 m; 17.4°C. Elsewhere: widespread in Indo-Pacific from southwestern Indian Ocean to Hawaiian Islands, including Japan and Kermadec Islands; 71–508 m (Cairns and Zibrowius 1997).

Caryophyllia (*C.*) *quadragenaria* Alcock, 1902a

Caryophyllia quadragenaria Alcock, 1902a: 91–92.—Cairns, 1995: 45–46, pl. 7, figs. g–h

(synonymy and description).—Cairns and Zibrowius, 1997: 93.

New Records

Soela: stn 02/82/10A, 4: 2 (WAM 44–84), 2 (USNM 97816); stn 02/82/13A, 1, WAM 84–84.

Distribution

Western Australia: off Port Hedland; 154–201 m on rubble substrate. Elsewhere: western Pacific from Japan to New Zealand (Cairns and Zibrowius 1997); 54–385 m.

Caryophyllia (*C.*) *stellula* sp. nov.

Figure 2 a–c

Caryophyllia epithecata – Gardiner, 1904: 114–117 (in part: localities I–V; pl. 1, figs. 3 a–c).—Cairns and Keller, 1993: 219 [Not *Caryophyllia clavus* var. *epithecata* Duncan, 1873: 312–313, pl. 48, figs. 13–16 (=C. *smithii*)].

Records

Diamantina: stn 25, holotype and 11 paratypes: 7 (WAM 301–88), 4 (USNM 97817); stn 20, 1 paratype, WAM 250–93;

Comet: 33°19'S, 128°00–05'E, 240–245 m, 13–14 I 1989, 4 paratypes, SAM H853, 856, and 871; 33°20'S, 127°45–50'E, 240–260 m, 16 I 1989, 10 paratypes, SAM H852, 855, 857, 859; 33°19'S, 127°31'E, 240 m, 12 I 1989, 1 paratype, SAM H851.

Type Locality

31°48'S, 114°08'E (west of Rottneest Island); 402 m.

Description

Corallum ceratoid, often curved up to 90°, usually having a slender (0.6–1.3 mm diameter) eroded, unattached base. However, several coralla have a narrow attached pedicel, the PD:GCD only 0.11–0.15, these coralla also slightly curved. The base of one corallum encrusts a small shell fragment, and is in the process of enveloping it and becoming free of attachment. Calice elliptical: GCD:LCD = 1.08–1.37. Longest specimen (holotype) 11.7 × 10.7 mm in calicular diameter and 31.1 mm in length, having an open eroded base. Theca thick and sparsely covered with encrusting calcareous epifauna and often bored with tiny holes. Intercostal striae shallow, resulting in poorly defined costae; costal granulation low and inconspicuous, about 4 low, rounded granules occurring across the width of a costa. Theca thick, producing a dense corallum; theca adjacent to calicular edge light yellow-brown.

Septa hexamerally arranged in 4 cycles (S1–2>S3>S4), a full fourth cycle attained at a GCD as small as 6 mm. Specimen with largest calice

(SAM H851) 15.6 × 11.4 mm in diameter, having 2 pairs of S4 in one half-system, resulting in 52 septa and 13 pali (i.e., 11 P3 and 2 P4). S1–2 little exsert (0.8–1.4 mm), extend about 2/3 distance to columella, having slightly sinuous inner edges. S3 and S4 less exsert (0.6–0.8 mm), the S3 about 2/3 width of the S1–2, having highly sinuous inner edges. S4 about 4/5 width of the S3, having slightly sinuous inner edges. A well-defined crown on 12 P3, each palus 1.7–2.0 mm wide, occurs about 2 mm below calicular edge. Pali thin and coarsely granular, having sinuous edges. Fascicular columella composed of 3–10 slender, twisted elements, recessed 2 mm below upper edges of pali.

Remarks

Among the approximately 65 species of Recent *Caryophyllia* (see Cairns 1991; Best et al. 1995), *C. stellula* is unique in its tendency to pass through a stage having a narrow pedicel to an adult stage characterized by an unattached, cornute corallum. It is most similar to *C. squiresi* Cairns, 1992, known only from the Subantarctic region off Tierra del Fuego and the Falkland Islands at 646–845 m, but differs in having a smaller, more slender, and more curved corallum.

Gardiner (1904) reported specimens of *C. stellula* as "*Caryophyllia epithecata* n. sp." from South Africa, elevating Duncan's (1873) *Caryophyllia clavus* var. *epithecata* to the species level but treating it as a new species. However, according to the International Code of Zoological Nomenclature (1985: article 45g), a variety named before 1961 should be treated as a subspecies (or of the species rank), and therefore the correct author of *Caryophyllia epithecata* should be Duncan (1873). Regardless, Zibrowius (1974b) showed Duncan's variety *epithecata* to be a junior synonym of *C. smithii* and not conspecific with the South African species. Thus, this taxon, which is found off South Africa and now Western Australia, requires a new name. Zibrowius (1974b) also suggested that a specimen he reported as *Caryophyllia* sp. from St. Paul Island and *C. sewelli* Gardiner and Waugh, 1938 from the Red Sea were conspecific with Gardiner's (1904) specimens. This equivalence is doubted based on their thicker pedicels, straight coralla, and coarser pali.

Distribution

Western Australia: west of Rottneet Island; Great Australian Bight southwest of Eucla; 240–402 m. Elsewhere: southeastern (warm temperate) South Africa; 166–420 m (Gardiner 1904).

Etymology

The species name comes from the Latin *stellula*, meaning little star.

Caryophyllia (*C.*) *atlantica* (Duncan, 1873)

Bathycyathus atlanticus Duncan, 1873: 318, pl. 48, figs. 1–2.

Caryophyllia alcocki Vaughan, 1907: 73–74, pl. 5, fig. 1.

Caryophyllia atlantica – Zibrowius, 1980: 56–57, pl. 20, figs. A–K (synonymy and description).—Cairns, 1995: 47–48, pl. 8, figs. d–e (synonymy and description).

Caryophyllia pacifica Keller, 1981: 16–17, pl. 1, figs. 2a–b.

New Records

Soela: stn 01/84/49, 1, WAM 766–84; stn 01/84/54, 4, WAM 265–93; stn 01/84/55, 7: 4 (WAM 553–84), 3 (USNM 97819); stn 01/84/56, 2, WAM 565–84; stn 01/84/57, 1, WAM 735–84; stn 01/84/120, 1, WAM 1021–85; stn 01/84/122, 1, USNM 97818.

Umataka Maru: stn 6921, 1, WAM 433–96.

Lady Basten: stn LB6(s), 1, WAM 41–96.

Lady: stn RW96–18, 1, NTM C8094.

Remarks

The number of septa known for this species ranges from 48 (12 pali) to 72 (18 pali). All Western Australian specimens have the lower number of 48 septa and 12 pali, consistent with previously reported specimens from the central Pacific (Keller 1981).

Distribution

Western Australia: continental slope of northwestern coast south of Cartier Island to south of Rowley Shoals; 193–530 m, on soft and rubble substrates. Elsewhere: despite its provincial name this species is widely distributed, including the eastern Atlantic, central Pacific, and Campbell Rise; 776–2165 m.

Caryophyllia (*C.*) *grandis* Gardiner and Waugh, 1938

Caryophyllia grandis Gardiner and Waugh, 1938: 177, pl. 1, fig. 2.—Cairns and Keller, 1993: 234 (synonymy).—Cairns and Zibrowius, 1997: 96, figs. 7 g–h (diagnosis).

Caryophyllia sp. ?Veron, 1986: 605, black and white fig.

New Records

Soela: stn 02/82/35, 1, WAM 109–83; stn 01/84/77, 2, WAM 527–84; stn 01/84/79, 1, WAM 748–84; stn 01/84/81, 2, WAM 674–84; stn 01/84/82, 1, WAM 677–84; stn 01/84/92, 4, WAM 689–84; stn 01/84/100, 4, WAM 691–84; stn 01/84/111, 1, WAM 694–84; stn 01/84/120, 7: 4 (WAM 703– and

804–84), 3 (USNM 97820); stn 01/84/121, 1, WAM 793–84; stn 01/84/122, 1, WAM 731–84.

Courageous: stn 002, 1, WAM 56–84; stn 003, 6: 3 (WAM 57– and 72–84), 3 (USNM 96988); stn 011, 1, WAM 58–84; stn 013, 2, WAM 59–84; stn 015, 5, WAM 60–84; stn 033, 1, WAM 70–84.

Distribution

Western Australia: continental slope of northwestern coast from Cartier Island to off Port Hedland; 394–596 m. Elsewhere: tropical Indian Ocean; Indonesia; 183–595 m (Cairns and Zibrowius 1997).

Subgenus *Acanthocyathus* Milne Edwards and Haime, 1848a

Caryophyllia (*A.*) *grayi* (Milne Edwards and Haime, 1848a)

Acanthocyathus grayi Milne Edwards and Haime, 1848a: 293, pl. 9, figs. 2, 2a.

Caryophyllia (*A.*) *grayi* – Cairns, 1994: 49, pl. 21, figs. i–k (synonymy and description).—Cairns and Zibrowius, 1997: 97–98, figs. 7 c, f, i.

New Records

Soela: stn 05/82/47, 1, WAM 30–85.

Diamantina: stn 92, 1, WAM 138–83.

Lady Basten: stn LB5(s), 4, WAM 31–96; stn LB5(t), 1, WAM 15–96.

Remarks

The specimen from *Lady Basten* stn LB5(t), measuring 23.8 × 16.7 mm in calicular diameter and 32.5 mm in height, is the largest known corallum.

Distribution

Western Australia: continental shelf of western shelf off Cape Jaubert and Shark Bay (False Entrance); 130–150 m. Elsewhere: Indo-West Pacific from southwestern Indian Ocean to Japan; 37–490 m (Cairns and Zibrowius 1997).

Caryophyllia (*A.*) *unicristata* Cairns and Zibrowius, 1997

Caryophyllia (*A.*) *unicristata* Cairns and Zibrowius, 1997: 101–102, figs 9 d–e.

New Records

Soela: stn 01/84/52, 1, WAM 602–87; stn 01/84/65, 4: 2 (WAM 663–84), 2 (USNM 96989).

Courageous: stn 002, 1, WAM 61–84; stn 003, 2, WAM 68–84.

Distribution

Western Australia: continental slope of

northwestern coast from south of Scott Reef to southwest of Rowley Shoals; 302–450 m, on soft (muddy) substrates. Elsewhere: Arafura Sea; 251–477 m (Cairns and Zibrowius 1997).

Caryophyllia (*A.*) *decamera* sp. nov.

Figure 2 d–f

Caryophyllia (*A.*) *dentata* – Cairns and Zibrowius, 1997: 98 (in part: seven lots of decamerall specimens, fig. 8 b, d).

Records

DEKI: stn 3, holotype (USNM 96858) and 4 paratypes (USNM 96849).

KARUBAR: stn 49, 1 paratype, USNM 96956; stn 65, 3 paratypes, USNM 96857.

Soela: stn 01/84/85, 1 paratype, WAM 681–84.

Umataka Maru: stn 6920, 6 paratypes, WAM 132– and 134–84.

Type Locality

5°32'S, 132°36'E (Banda Sea, Kei Islands), 245 m.

Description

Corallum compressed (GCD:LCD = 1.3–1.4) and usually curved 90° in plane of GCD. Holotype 12.5 × 9.3 mm in calicular diameter and 13.4 mm in height. Pedicel small (1.2–1.5 mm in diameter) and circular in cross section. C1–2 low and rounded, covered with low, rounded granules. C1 on convex thecal edge ridged, bearing 4 or 5 prominent spines; one spine also often present on concave thecal edge. Corallum light brown. Septa decamerally arranged in 3 size classes (10:10:20, 40 septa). Primary septa highly exsert (up to 2.8 mm), each pair forming a rectangular lancet with its adjacent tertiaries. Inner edges of primary septa moderately sinuous. Secondary septa half width of primaries, having very sinuous inner edges. Tertiary septa 1/3 to 1/2 width of a secondary, having moderately sinuous inner edges. A crown of 10 lamellar, highly sinuous pali occurs before the secondary septa. Fossa of moderate depth, containing a fascicular columella composed of 3–8 slender twisted elements.

Remarks

As noted by Cairns and Zibrowius (1997), several specimens they identified as *C. dentata* were atypical in having decamerall symmetry. Those specimens, combined with additional coralla from Western Australia, form the basis of the description of *C. decamera*. To reiterate and amplify, *C. decamera* differs from *C. dentata* in having: decamerall septal symmetry, instead of hexamerall symmetry (i.e., 40 septa vs 48 septa); low, granular costae, not highly ridged costae; a tendency to have a single costal spine on the concave thecal edge;

and a tendency to have a curved corallum, instead of being straight.

Distribution

Western Australia: continental slope of northwestern coast from Kimberley to Rowley Shoals; 224–260 m. Elsewhere: Indonesia (Banda Sea, Arafura Sea); 176–263 m (Cairns and Zibrowius 1997).

Etymology

The species name *decamera* (Latin *decem*, ten + *camera*, chamber) alludes to the decamerall symmetry of the species resulting in ten equal chambers, or systems, of septa.

Genus *Crispatotrochus* Tenison Woods, 1878b

Crispatotrochus rugosus Cairns, 1995

Crispatotrochus rugosus Cairns, 1995: 57, pl. 13, figs. a–b.—Cairns and Zibrowius, 1997: 104.

New Record

Soela: stn 01/84/55, 6, WAM 560–84 and 453–96.

Distribution

Western Australia: continental slope off Cape Leveque, Dampier Land; 296–298 m. Elsewhere: Philippines; Malaysia; Kermadec Islands; Lord Howe Seamount Chain; 142–508 m (Cairns and Zibrowius 1997).

Crispatotrochus inornatus Tenison Woods, 1878b

Figure 2 g–h

Crispatotrochus inornatus Tenison Woods, 1878b: 309–310, pl. 6, figs. 2a–c.—Cairns and Parker, 1992: 20–21, pl. 5, figs. a, d, g–h (synonymy and description).

New Records

Soela: stn 01/84/74, 1, WAM 534–84.

Lady: stn RW96–29, 1, NTM C8087.

Distribution

Western Australia: continental slope south of Cartier Island and west of Browse Island; 302–400 m. Elsewhere: southeastern Australia off Victoria and New South Wales; 146–220 m (Cairns and Parker 1992).

Genus *Oxysmilium* Duchassaing, 1870

Oxysmilium circularis sp. nov.

Figure 2 i–k

Records

Soela: stn 02/82/16, holotype, WAM 102–83; stn

02/82/17, cluster of 9 paratypes, WAM 105–83; stn 02/83/13A, 4 paratypes: 1 (WAM 85–84), 3 (USNM 96990).

Type Locality

18°41'S, 117°54'E (off Port Hedland, WA); 200–204 m.

Description

Corallum elongate-conical, straight to slightly bent, and attached by a slender (PD:GCD = 0.26–0.28), nonreinforced pedicel. Holotype 19.1 mm in calicular diameter, 31 mm in height, and 5.5 mm in pedicel diameter. Calice circular. Theca heavily encrusted with calcareous epifauna, obscuring costae. Septa hexamerally arranged in 5 cycles, the fifth not complete: S1>S2>S3>S4>S5. Holotype contains 66 septa: 5 half-systems with no S5, 5 having 1 pair of S5, and 2 having 2 pairs of S5. S1 slightly exsert (about 1.2 mm), with straight, thickened inner edges reaching to columella. S2 about 4/5 width of the S1, also having straight inner edges. S3 4/5 width of the S2, with straight inner edges. S4 half width of the S3, unless flanked by a pair of S5, in which case they are almost as large as the S3, the S5 being half the width of the S4. Septal faces bear numerous very small, low granules, resulting in almost smooth, planar faces. Fossa deep, containing a papillose columella composed of 1–10 slender, irregularly-shaped pillars.

Remarks

Only one other Recent species is known in this genus, *O. rotundifolia* (Milne Edwards and Haime 1848a), endemic to the western Atlantic at depths of 46–640 m (Cairns 1979). *O. circularis* differs in having a circular calice (that of *O. rotundifolia* is elliptical); S1 that are wider than the S2 (S1 and S2 are equal in width in *O. rotundifolia*); a nonreinforced base (the base of *O. rotundifolia* is often reinforced with rings of exothecal rootlets); and in having fewer septa (66 vs 96+), although larger coralla of *O. circularis* may prove to have a complete fifth cycle.

Distribution

Western Australia: continental slope of northwestern coast off Port Hedland and south of Rowley Shoals; 201–404 m; 9.6°–16.2°C.

Etymology

This species name *circularis* (Latin *circularis*, round) refers to the round calice of this species.

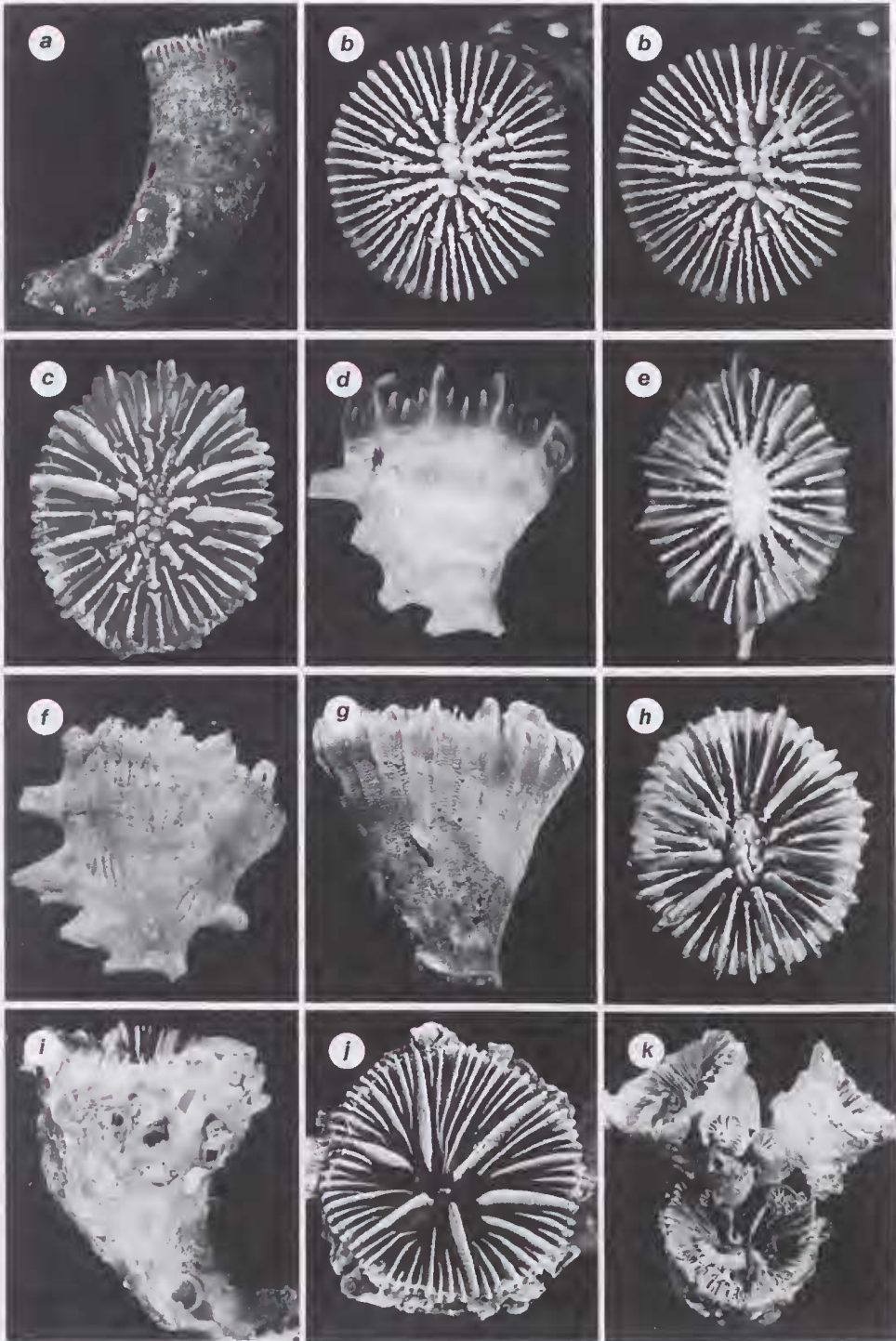


Figure 2 a-c, *Caryophyllia stellula*: a-b, side and stereo calicular views of holotype, x 2.0; c, calicular view of a paratype from a Comet station, SAM H859, x 3.6. d-f, *Caryophyllia (A.) decamera*: d-e, side and calicular views of holotype, x 3.1, x 3.6, respectively; f, paratype, Soela stn 01/84/85, WAM 681-84, side view, x 3.1. g-h, *Crispatotrochus inornatus*, Soela stn 01/84/74, WAM 534-84, side and calicular views, x 2.8. i-k, *Oxysmilia circularis*: i-j, side and calicular views of holotype, x 1.9, x 2.2, respectively; k, Soela stn 02/82/17, WAM 105-83, a cluster of paratypes, x 1.1.

Genus *Trochocyathus* Milne Edwards and Haime, 1848a

Trochocyathus philippinensis Semper, 1872

Trochocyathus philippinensis Semper, 1872: 253, pl. 20, fig. 16.—Cairns and Zibrowius, 1997: 107–108, figs. 10 d–e (synonymy and description).

New Records

Soela: stn 02/82/10A, 7: 4 (WAM 49–84), 3 (USNM 96991); stn 02/82/51, 1, WAM 115–83.

Lady Basten: stn LB5(s), 19, WAM 26–96; stn LB5(t), 1, WAM 454–96.

Distribution

Western Australia: continental shelf of northwestern coast off Port Hedland; 100–154 m. Elsewhere: western Pacific from Ryukyu Islands to Banda Sea; 100–268 m (Cairns and Zibrowius 1997).

Trochocyathus apertus Cairns and Zibrowius, 1997

Caryophyllia (*Premocyathus*) *compressa* – Wells, 1956: F422, fig. 323,3.

Premocyathus compressus – Cairns, 1984: 14 (in part: *Albatross* specimens).—Veron, 1986: 605, black and white fig.

Trochocyathus apertus Cairns and Zibrowius, 1997: 109–110, figs. 11 a–d.

New Records

None.

Remarks

As the synonymy indicates, this species of *Trochocyathus* has been confused with *Premocyathus compressus* Yabe and Eguchi, 1942 by several authors. Although their coralla are quite similar — both species having curved coralla with an open base — *T. apertus* differs in having a papillose (not fascicular) columella and rudimentary P1–2 as well as well-developed P3.

Distribution

Western Australia: Veron (1986) illustrated a specimen from Point Cloates, WA (20–?230 m), which is the only known record from this state. Elsewhere: Philippines and Indonesia; 33–70 m (Cairns and Zibrowius 1997). ?Great Barrier Reef (Veron, 1986).

Genus *Paracyathus* Milne Edwards and Haime, 1848a

Paracyathus rotundatus Semper, 1872

Paracyathus rotundatus Semper, 1872: 253–254, pl.

20, figs. 15a, b.—Faustino, 1927: 72–73, pl. 5, figs. 13–14.—Cairns and Zibrowius, 1997: 115–116, figs 13 d–e.

?*Paracyathus caeruleus* Duncan, 1889: 5, pl. 1, figs. 10–11.

?*Paracyathus merguiensis* Duncan, 1889: 6, pl. 1, figs. 12–14.

New Records

Soela: stn 05/82/22, 1, WAM 53–83; stn 05/82/71, 1, WAM 80–83.

Distribution

Western Australia: continental shelf off Dampier Archipelago; 30–40 m. Elsewhere: western Pacific from South China Sea to Indonesia; 18–66 m (Cairns and Zibrowius 1997); ?Mergui Archipelago (Duncan 1889).

Paracyathus ?fulvus Alcock, 1893

Figure 4 d, g

Paracyathus fulvus Alcock, 1893: 139–140, pl. 5, figs. 2, 2a.

New Records

Soela: stn 01/84/54, 3: 2 (WAM 21–85), 1 (USNM 96993); stn 01/84/109, 1, WAM 693–84.

Redescription

Corallum subcylindrical and squat, the 3 known specimens all firmly attached to the tip of the siphonal canal of a gastropod shell, also encrusting the shell with a thin costate, granular coenosteum as far as 20 mm from the pedicel. Largest Western Australian specimen (WAM 21–85) 12.8 × 11.9 mm in calicular diameter and 10.8 mm in height. Calice circular to slightly elliptical (GCD:LCD = 1.0–1.12). Costae broad (0.8–1.0 mm), slightly convex, and covered with small granules such that 4–7 occur across the width of one costa near the calicular edge. Corallum white except for the S1, which are light brown near calicular edge. Septa hexamerally arranged in 4 complete cycles (48 septa): S1>S2>S4>S3. S1 moderately exsert (up to 2.5 mm), thick, and extend about 2/3 distance to columella. S2 about 1.5 mm exsert and 3/4 width of the S1. S3 1.0 mm exsert and 3/4 width of the S3. S4 as exsert as the S2, each pair of S4 being fused to an S1 at the calicular edge in a lancetted profile; S4 slightly wider than S3. All septa have moderately sinuous inner edges and granular (spinose) septal faces. S1–3 bear 1–4 slender paliform lobes, each progressive cycle of lobes rising slightly higher in the fossa. P4 paliform lobes merge with the P3 adjacent to columella. All paliform lobes bear oblique carinae, merging with the columella toward center of fossa. Fossa of moderate depth, containing a well-

developed papillose columella consisting of many small interconnected irregularly shaped elements.

Remarks

Among the approximately 19 Recent species of *Paracyathus* (Best et al. 1995), only *P. fulvus* has S1 larger than its S2 and a strongly encrusting base. It is not possible to confirm this identification without having examined the holotype in the Calcutta Museum, and thus this identification is considered tentative. This is believed to be the only report of *P. fulvus* subsequent to its original description.

Folkson (1919) also reported *Paracyathus profundus* Duncan, 1889 from the same station as above, but re-examination of this specimen reveals that it has deteriorated significantly since originally reported. What remains appears to be the corallum of a rhizangioid.

Distribution

Western Australia: continental slope of northwestern coast off Dampier Land; 350–433 m. Elsewhere: Persian Gulf; depth unknown (telegraph cable).

Genus *Stephanocyathus* Seguenza, 1864

Subgenus *Acinocyathus* Wells, 1984

Stephanocyathus (*A.*) *spiniger* (Marenzeller, 1888)

Stephanotrochus spiniger Marenzeller, 1888: 20–21.

Odontocyathus sexradii – Hoffmeister, 1933: 10, pl. 1, figs. 6–8.

Stephanocyathus spiniger – Veron, 1986: 607, black and white fig.

Stephanocyathus (*A.*) *spiniger* – Cairns and Parker, 1992: 26–27, pl. 7, figs. g–i (synonymy and description).—Cairns and Zibrowius, 1997: 118–119, fig. 13 f, fig. 14 d.

New Records

Soela: stn 01/84/54, 1, WAM 549–84; stn 01/84/55, 1, WAM 558–84; stn 01/84/120, 4: 2 (WAM 806–84), 2 (USNM 96994); stn 01/84/121, 3, WAM 402–86; stn 01/84/122, 1, WAM 730–84.

Courageous: stn 002, 3: 2 (WAM 25–84), 1 (USNM 96995); stn 023, 1, WAM 29–84.

Distribution

Western Australia: continental slope of northwestern coast from Dampier Land to Port Hedland; 298–535 m; soft (muddy) substrates. Elsewhere: widespread from southwestern Indian Ocean to Japan, including ridges north of New Zealand and the Great Australian Bight off southwestern South Australia (Cairns and Parker 1992; Cairns and Zibrowius 1997).

Stephanocyathus (*A.*) *explanans* (Marenzeller, 1904)

Stephanotrochus explanans Marenzeller, 1904: 304–307, pl. 18, figs. 19a–b.

Stephanocyathus (*A.*) *explanans* – Cairns and Keller, 1993: 243–244.—Cairns and Zibrowius, 1997: 119, fig. 14 e (synonymy and description).

New Records

Soela: stn 01/84/51, 1, WAM 541–84; stn 01/84/60, 1, WAM 575–84; stn 01/84/61, 1, WAM 737–84; stn 01/84/71, 1, WAM 536–84; stn 01/84/80, 1, WAM 670–84; stn 01/84/81, 1, WAM 673–84; stn 01/84/116, 2, USNM 96997; stn 01/84/118, 1, WAM 780–84; stn 01/84/121, 1, WAM 792–84.

Courageous: stn 003, 2, WAM 27–84; stn 015, 2, USNM 96996; stn 025, 1, WAM 31–84.

Diamantina: stn 25, 1, WAM 302–83.

Lady: stn RW96–30, 1, NTM C8090.

Distribution

Western Australia: continental slope of western coast from Cartier Island to Rottneest Island; 180–500 m; soft (muddy) substrates. This may be the *Stephanocyathus* species alluded to by Veron (1986: 607) from Rottneest Island. Elsewhere: southwestern Indian Ocean through Indonesia; 183–1016 m (Cairns and Zibrowius 1997).

Genus *Deltocyathus* Milne Edwards and Haime, 1848a

Deltocyathus magnificus Moseley, 1876

Figure 4 a

Deltocyathus magnificus Moseley, 1876: 552–553.—Grygier, 1991: 43, fig. 21G.—Cairns and Parker, 1992: 27–28, pl. 7, figs. j–l, pl. 8, fig. a.—Cairns, 1994: 56, pl. 24, figs. d–e, g–h (synonymy and description).—Cairns and Zibrowius, 1997: 126–127.

Fungiacyathus sp. Veron, 1986: 598, black and white fig.

New Records

Soela: stn 01/84/51, 2, WAM 540–84; stn 01/84/55, 1, WAM 556–84; stn 01/84/60, 3: 2 (WAM 574–85), 1 (USNM 96998); stn 01/84/67, 3, WAM 744–84; stn 01/84/77, 1, USNM 96999; stn 01/84/80, 1, WAM 671–84; stn 01/84/85, 1, WAM 679–84; stn 01/84/91, 2, WAM 688–84; stn 01/84/120, 6, WAM 701– and 807–84; stn 01/84/122, 1, WAM 729–84; stn 02/82/21, 1, WAM 26–83 (figured by Veron, 1986); stn 02/82/27, 1, WAM 35–83; stn 02/82/28, 1, WAM 106–84; stn 02/82/29, 1, WAM 33–83; stn 02/82/31, 1, WAM 434–96; stn 02/82/35, 1, WAM 31–83; stn 02/82/46, 1, WAM 38–83; stn 04/82/8B, 1, WAM 83–83.

Lady: stn RW96–19, 5, NTM C8085.

Courageous: stn 83/25, 1, WAM 107–84; stn 002, 1, WAM 63–84; stn 003, 1, WAM 62–84; stn 004, 1, WAM 65–84; stn 013, 2, WAM 64–84.

Umataka Maru: stn 6920, 1, WAM 128–84; stn 6921, 1, WAM 147–84; stn 6922, 1, WAM 1024, 85; stn 6926, 1, WAM 104–84.

Surefire: stn 5, 1, WAM 187–92.

Remarks

First reported from Western Australia by Grygier (1991) as the host of a petraroid ascithoracid crustacean, one additional specimen from *Soela* stn 01/84/120 is reported and figured (Fig 4a) that contains this characteristic crustacean gall. Similar galls have also been reported from this species in the Japan region (Grygier and Nojima 1995).

Distribution

Western Australia: common on continental slope of northwestern coast from Cartier Island to Port Hedland; 260–696 m; 8.2°–9.0°C; soft (muddy) substrates. Elsewhere: western Pacific from Japan to southeastern Australia; 88–1500 m (Cairns and Zibrowius 1997).

Deltocyathus suluensis Alcock, 1902c

Deltocyathus magnificus var. *suluensis* Alcock, 1902c: 20–21.

Deltocyathus suluensis – Cairns and Zibrowius 1997: 125, fig. 16 d (synonymy and description).

New Records

Soela: stn 01/84/60, 1, WAM 576–84; stn 01/84/63, 1, WAM 738–84; stn 01/84/120, 3: 2 (WAM 700–84), 1 (USNM 97000).

Courageous: stn 000 or 001, 1, WAM 67–84; stn 002, 1, WAM 69–84.

Distribution

Western Australia: continental slope of northwestern coast from Dampier Land to Port Hedland; 401–530 m; soft (muddy) substrates. Elsewhere: Philippines; Indonesian region; ridges north of New Zealand; 142–565 m (Cairns and Zibrowius 1997).

Deltocyathus sarsi (Gardiner and Waugh, 1938)

Figure 3 k–l

Fungiacyathus sarsi Gardiner and Waugh, 1938: 201, pl. 7, figs. 17–18 (description).

New Record

Diamantina: stn 45, 1, WAM 1028–79.

Remarks

Among the approximately 20 extant species of

Deltocyathus, 4 have 5 cycles of septa and only 3 frequently reproduce by fragmentation, *D. sarsi* being the only species to have both characters. It differs from *D. suluensis* in having a regenerated corallum and much better developed S5. The single specimen reported herein of 15.1 mm in calicular diameter is thought to be the only record of this species subsequent to its original description.

Distribution

Western Australia: continental shelf of southwestern coast north of Rottnest Island; 80 m. Elsewhere: Maldive Islands (Kolumadulu Atoll); 44 m (Gardiner and Waugh 1938).

Genus *Heterocyathus* Milne Edwards and Haime, 1848a

Heterocyathus aequicostatus Milne Edwards and Haime, 1848a Figure 3 a–b

Heterocyathus aequicostatus Milne Edwards and Haime, 1848a: 324, pl. 10, fig. 8.—Folkesson, 1919: 8–10 (in part: pl. 1, figs. 8–9).—Wells, 1964: 108.—Veron, 1986: 558–559 (in part: color fig., not black and white, which is *Heteropsammia*).—Hoeksema and Best, 1991: 226–230, figs. 1–11 (synonymy, key, and diagnosis).

New Records

Crown of Thorns Survey (1972, 1974): Dampier Archipelago (Rosemary Island and Norbill Bay, 0–5 m), collectively 65 specimens from 6 collections: 58 (WAM 152–, 162–, 163–, and 164–83; 248–, and 262–93) and 7 (USNM 97001).

Other records: South Head, Beagle Bay, beach drift, 28 X 1988, 1, WAM 1056–88; near Keraudren, Western Australia, low tide, IX 1976, 13, WAM 151–83.

Diagnosis

Corallum relatively large (10 mm in GCD) and squat, either free of attachment or encrusting a scaphopod or gastropod shell; primary sipunculid efferent pore circular, 2.0–2.2 mm in diameter, usually located aborally, and often lending an asymmetry to corallum. Additional smaller (0.4 mm in diameter) sipunculid pores (previous efferent pores that have been subsequently overgrown by the coral but still retain an open canal through the corallum (Yonge 1975)) also occur on lateral thecal faces. Corallum entirely white. Costae equal in width as well as being approximately equal in width to intercostal furrows. Septa crowded and hexamerally arranged in 4 complete and often an incomplete fifth cycle (48–72 septa): S1>S2>S4>S3 or S1>S2>S3>S5>S4, depending on the presence of pairs of S5 in a half-system. Outer edges of septa slope inward toward

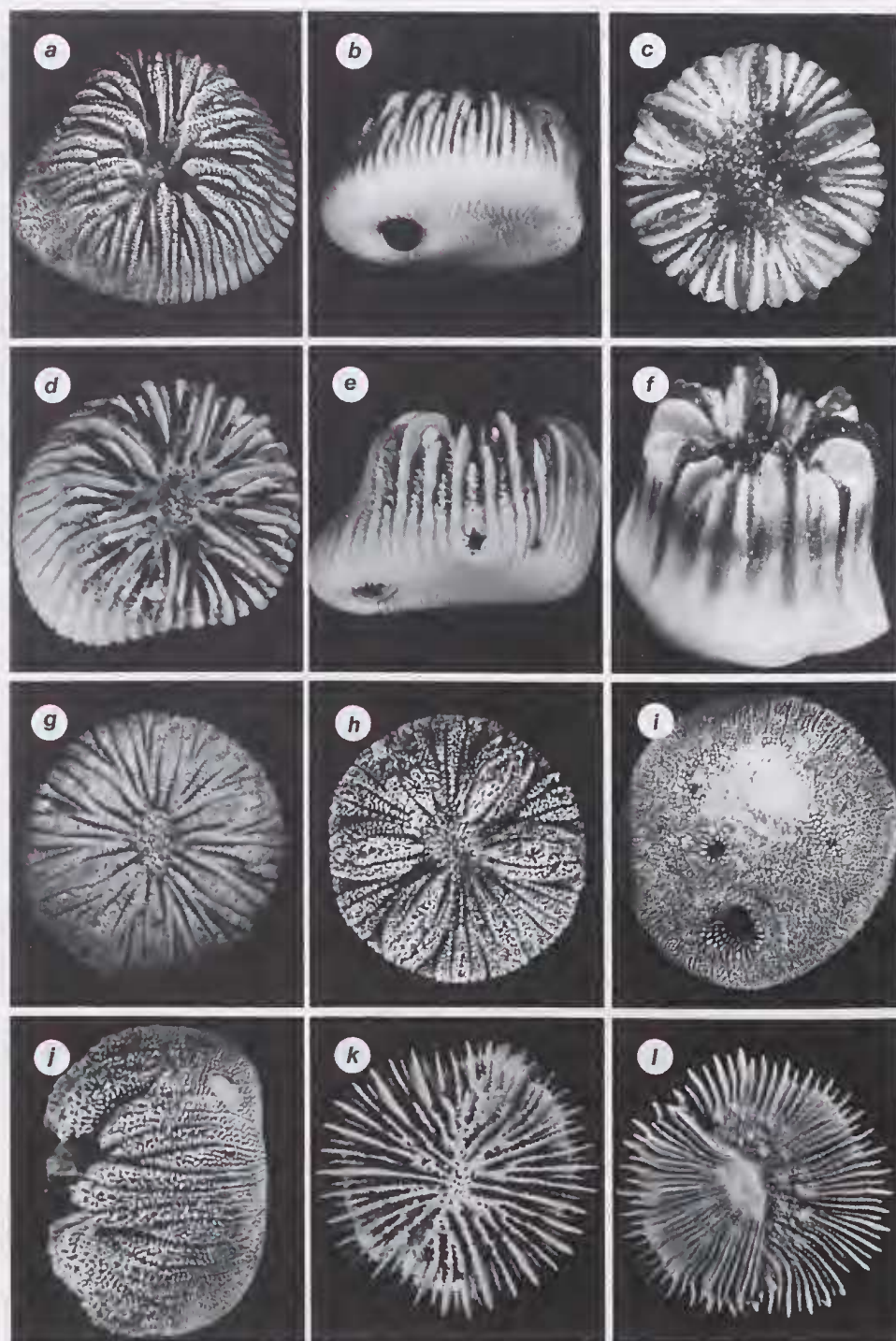


Figure 3 a-b, *Heterocyathus aequicostatus*, Rosemary Island, WAM 263-93, oblique and side views, x 2.9. c, f, *H. sulcatus*, Lady Basten stn LB1b, WAM 8-96, calicular and side views, x 5.2. d-e, *H. alternatus*, Lady Nora Flats, WAM 435-96, calicular and side views, x 5.2. g-j, *H. hemisphaericus*: g, holotype, BMNH, calicular view, x 4.1; h-j, calicular, basal, and side views of syntype of *Spongiocyathus typicus*, SMNH 4756, x 4.1, x 4.4, x 4.8, respectively. k-l, *Deltocyathus sarsi* from Rottnest Island, WAM 1028-79, calicular and basal views, both x 3.0.

columella, not projecting outward. Septa adjacent to S1 (either S4 or S5) almost as exsert as the S1–2 but less wide and porous. Multiple paliform lobes often present on all septa; columella trabecular.

Remarks

Heterocyathus aequicostatus is the most commonly collected and reported of the four congeners, which is also true for the Western Australian region. According to Hoeksema and Best (1991), it has 15 junior synonyms. All four species co-occur and are sometimes difficult to distinguish, but *H. aequicostatus* differs by having closely packed septa, a white corallum, and relatively porous higher cycle septa.

Distribution

Western Australia: continental shelf of western coast from Beagle Bay to Shark Bay (Veron 1986); 0–20 m. Elsewhere: Indo-West Pacific; depth range not known.

Heterocyathus alternatus Verrill, 1865

Figure 3 d–e

Heterocyathus alternata Verrill, 1865: 149.

Heterocyathus alternatus – Folkeson, 1919: 10–11, pl. 1, figs. 10–11.—Hoeksema and Best, 1991: 230–231, figs. 12–18 (synonymy, diagnosis, key).

New Records

Rosemary Island, Dampier Archipelago (Norbill Bay and Lady Nora Flats), 0–5 m, 13: 11 (WAM 435–96 and 480–96), 2 (USNM 97002); Mermaid Sound, Dampier Archipelago, Conzinc Island, 7–9 m, 1, WAM 340–88.

Remarks

Heterocyathus alternatus is most similar to *H. aequicostatus*, but can be distinguished by having: less crowded septa, the S4 of which are angled toward their adjacent S3 giving the septa of the calice a stellate aspect; and having more solid and taller S4, appearing as small lobes fused to the sides of the S1–2. Hoeksema and Best (1991) provided a key to the species of this genus.

Distribution

Western Australia: known only from Dampier Archipelago; 0–9 m. Elsewhere: Indo-West Pacific; depth range not known (Hoeksema and Best 1991).

Heterocyathus sulcatus (Verrill, 1866)

Figure 3 c, f

Stephanoseris sulcata Verrill, 1866: 48.

Heterocyathus pulchellus Rehberg, 1892: 8–9, pl. 1, figs. 7a–b.

Heterocyathus aequicostatus – Folkeson, 1919: 8–10 (in part: pl. 1, figs. 4–7).—Hoeksema and Best, 1991: 231–233, figs. 19–23 (synonymy, key, and diagnosis).

New Records

Soela: 05/82/unknown station number, off Port Hedland, depth unknown, 2, USNM 97003.

Dorothea: 65 mi (=104 km) NE of Adele Island, 73 m, 1, WAM 143–83; 20 mi (=32 km) north of Adele Island, 73 m, 3, WAM 327–89.

Kunmunyah: stn BG47, 1, NTM C8014.

Lady Basten: stn LB1b(s), 2, WAM 8–96; stn LB5(s), 1, WAM 33–96.

Other records: Gulf of Carpentaria, "Gulf" stn 18, 3, USNM 93201.

Remarks

Heterocyathus sulcatus is one of three species in this genus recognized by Hoeksema and Best (1991), differentiated from the other two by having a relatively smaller corallum, only 48 septa, and a darkly pigmented (black or black-brown) fossa (septa, pali and columella). Alternating costae are also commonly pigmented.

Distribution

Western Australia: continental shelf of northwestern coast from Adele Island to Dampier Archipelago; 11–150 m. Elsewhere: northeastern Australia from Peron Islands, Northern Territory (reported herein) to Princess Charlotte Bay, Qd.; off Sri Lanka; Indonesia (Hoeksema and Best 1991); 17–36 m.

Heterocyathus hemisphaericus Gray, 1849

Figure 3 g–j

Heterocyathus hemisphaerica Gray, 1849: 77, pl. 2, figs. 3–4.

Psammoseris hemispherica – Milne Edwards and Haime, 1851: 127.—Wells, 1956: F436.—Veron, 1986: 610, black and white fig.

Spongiocyathus typicus Folkeson, 1919: 11–12, pl. 1, figs. 12–15.

New Records

Soela: stn 1/66, 1, WAM 355–90; stn 05/82/22, 1, WAM 52–83.

Other records: stn SB3, 24°54'S, 113°17.7'E, 23 m, 1, WAM 698–81; stn SB70, 25°31.8'S, 113°32.8'E, 11 m, 1, WAM 1012–81; stn eWm, Withnell Bay, Dampier Archipelago, depth unknown, 1, WAM 380–88; stn B5, 28°46.6'S, 114°04'E, 46 m, 1, WAM 880–89; stn H7, 28°49.5'S, 113°56.3'E, 37 m, 1, WAM 881–89; stn T8, 20°58'S, 115°55'E, 12 m, 1, WAM 354–90; stn E5, Mermaid Shoal, Dampier Archipelago, depth unknown, 1, WAM 29–85; stn

PAe, Mermaid Shoal, 9 m, 3, WAM 337-88; stn PE4-7, Mermaid Shoal, 13-16 m, 2, WAM 363- and 365-88; stn pAs, Mermaid Shoal, 7-9 m, 1, WAM 339-88; Norbill Bay, Dampier Archipelago, 1-2 m, 1, USNM 97004; 28°39.5'S, 113°49.5'E, 38 m, 4, WAM 139-83; *Peron* stn B159, Shark Bay, 1, WAM 228-93; Shark Bay, depth unknown, 1, USNM 97006; east of Sholl Island, Passage Islands, 12 m, 3, USNM 97005.

Remarks

Vaughan and Wells (1943) and Wells (1956) defined the suborder Dendrophylliina as having porous septa and theca (a synapticulotheca), and, believing *Psammoseris hemisphaerica* to have both porous septa and costae, placed it as a genus in that suborder. However, examination of the types of *H. hemisphaerica* (BMNH) and *Spongiocyathus typus* (SMNH 4753-56) reveals that, whereas their septa are highly porous, their costae and theca are solid, much like that of a turbinoliid. I therefore agree with Hoeksema and Best (1991) that *Psammoseris hemisphaerica* must be returned to the Caryophyllidae and the genus *Psammoseris* placed as a junior synonym of *Heterocyathus*. It is ironic that Folkson (1919) correctly placed *Psammoseris* in synonymy with *Heterocyathus*, but did not realize that his new genus *Spongiocyathus*, which he considered as a caryophylliid, was a junior synonym of *Heterocyathus* as well, based on the same species: *Heterocyathus hemisphaericus*.

Heterocyathus hemisphaericus differs from *H. aequicostatus* in having: 48 highly porous septa, only the S4 of *H. aequicostatus* being slightly porous, and usually numbering more than 48; very thick (i.e., 0.9 mm vs 0.15 mm wide) S1; costae that are much wider than the intercostae, composed of elongate spines that originate directly from the theca, not costae that are equal in width to the intercostae and composed of granules that ornament costal ridges, as in *H. aequicostatus*; sipunculid efferent pores and canals opening only on the base of the corallum, those of *H. aequicostatus* opening on the base and edges of the corallum.

Distribution

Western Australia: continental shelf of western coast from Cape Jaubert to Houtman Abrolhos Islands; 2-46 m. Elsewhere: ?South China Sea; depth range not known (Gray 1849).

Genus *Conotrochus* Seguenza, 1864

Conotrochus funicolumna (Alcock, 1902a)

Ceratotrochus (*Conotrochus*) *funicolumna* Alcock, 1902a: 93; 1902c: 11-12, pl. 1, figs. , 6a.

Conotrochus sp. cf. *C. funicolumna* - Cairns and Parker, 1992: 22, fig. 6c, f.

Conotrochus brunneus - Cairns and Parker, 1992: 22 (specimens cited from "southern Western Australia").

Conotrochus funicolumna - Cairns, 1994: 58-59, pl. 24, fig. i, pl. 25, figs g-l (synonymy and description).—Cairns and Zibrowius, 1997: 127.

New Records

Comet: 204-222 km southwest of Eucla, 240-245 m, 14 I 1989, 12, SAM H860-863.

Lady: stn RW96-18, 1, NTM C8076.

Remarks

This species was alluded to as *Conotrochus brunneus* by Cairns and Parker (1992), based on the SAM specimens documented above.

Distribution

Western Australia: known only from Great Australian Bight off Eucla and Point Dover; south of Cartier Island; 240-280 m. Elsewhere: western Pacific from Japan through Indonesia; Hawaiian Islands; Victoria, Australia; 88-616 m (Cairns and Zibrowius 1997).

Genus *Paraconotrochus* Cairns and Parker, 1992

Paraconotrochus zeidleri Cairns and Parker, 1992

Paraconotrochus zeidleri Cairns and Parker, 1992: 21-22, pl. 5, fig. i, pl. 6, figs. a-b (description).—Cairns and Zibrowius, 1997: 130.

New Records

Soela: stn 01/84/24, 2, NMV F78392; stn 01/84/77, 1, WAM 528-84; stn 01/84/78, 1, WAM 746-84; stn 01/84/79, 1, USNM 97007.

Distribution

Western Australia: continental slope of northwestern coast from Browse Island to Port Hedland; 304-484 m. Elsewhere: Tasmania; New South Wales; Indonesia; Admiralty Islands; 351-558 m.

Genus *Desmophyllum* Ehrenberg, 1834

Desmophyllum dianthus (Esper, 1794)

Madrepora dianthus Esper, 1794: pl. 69, figs. 1-3.

Desmophyllum cristagalli - Hoffmeister, 1933: 8-9, pl. 2, figs. 1-4.—Cairns and Parker, 1992: 28-29, pl. 8, fig. b-c (description).

Desmophyllum dianthus - Cairns, 1994: 26-27, pl. 9, figs. a-d (synonymy and description).—Cairns and Zibrowius, 1997: 131, figs 17 g-h.

New Record

Longva III: stn "2", 1, SAM.

Distribution

Western Australia: western Great Australian Bight; 963–1011 m. Elsewhere: virtually cosmopolitan, except for continental Antarctic and boreal North Pacific, but including southeastern Australia; 35–2460 m (Cairns and Parker 1992).

Genus *Thalamophyllia* Duchassaing, 1870

Thalamophyllia tenuescens (Gardiner, 1899)

Desmophyllum tenuescens Gardiner, 1899: 161–162, pl. 19, figs. 1a–b.

Thalamophyllia tenuescens – Cairns, 1995: 78, pl. 21, figs. g–i (description).—Cairns and Zibrowius, 1997: 133, figs. 17 d–e.

New Records

Stn 16, 13°56'S, 125°37'E (Cassini Island), "SCUBA depth", 18 VIII 1991, 1, WAM 436–96 (in part, attached to base of *Rhizopsammia verrilli*); stn C71, NE of Leo Island, Easter Group, Houtman Abrolhos Islands, 38 m, 1 IX 1972, 4 corallites, WAM 437–96.

Distribution

Western Australia: continental shelf off Cassini Island, Kimberley, and Houtman Abrolhos Islands; 38 m. Elsewhere: western Pacific from Philippines to Kermadec Islands, including off Queensland; 8–315 m (Cairns and Zibrowius 1997).

Genus *Asterosmilia* Duncan, 1867

Asterosmilia marchadi (Chevalier, 1966)

Dasmosmilia marchadi Chevalier, 1966: 944–949, pl. 5, figs. 3–4.

Asterosmilia marchadi – Zibrowius, 1980: 141–142, pl. 74, figs. A–K (synonymy and description).—Cairns and Zibrowius, 1997: 131–132, figs. 17 a–b.

New Records

Lady Basten: stn LB5(s), 11, WAM 30–96; stn LB5(t), 1, WAM 20–96.

Distribution

Western Australia: known only from continental shelf off Port Hedland; 150–160 m. Elsewhere: cosmopolitan in tropical seas, except for eastern Pacific; 32–229 m (Cairns and Zibrowius 1997).

Genus *Rhizosmilia* Cairns, 1978

"*Rhizosmilia*" *multipalifera* sp. nov.

Figure 4 b–c, e–f

Paracyathus porphyreus – Folkson, 1919: 12–13, figs. 16–17.

Records

Sprightly: stn 41M, holotype and 2 paratype colonies, WAM 129–83; stn 19M, 1 paratype colony, WAM 127–83; stn 20M, 1 paratype corallite, WAM 132–83; stn 30M, 1 paratype colony, USNM 97008; stn 33M, 1 paratype colony, WAM 360–79; stn 34M, 1 paratype colony, WAM 135–83; stn 40M, 1 paratype colony, USNM 97009; .

Diamantina: stn 55, 1 paratype colony, WAM 242–93; stn 76, 1 paratype corallite, WAM 148–83; stn 208, 1 paratype colony, WAM 226–93.

Other records: Cape Jaubert, 45 mi (72 km) WSW, 66 ft. (20 m), 2 paratypes, SMNH 223 (*Paracyathus porphyreus* of Folkson 1919).

Type Locality

30°16.8'S, 114°39.6'E (Jurien Bay), WA; 82 m.

Description

Encrusting colonies of up to 35 corallites, each corallite budding from a thin common basal coenosteum. Corallites cylindrical: up to 9.6 mm in GCD and 12 mm in height. Corallite base polycyclic, composed of concentric rings of hollow chambers formed by exothecal dissepiments covering raised costae. Calices elliptical to elongate in cross section: GCD:LCD = 1.1–1.6. Theca often heavily encrusted with calcareous epifauna; costae well developed only near calicular edge as thin ridges. Small corallites white, but larger corallites bear a brown pigmentation on theca near calicular edge. Septa hexamerally arranged in 4 cycles between a GCD of 5–8 mm; larger corallites have additional pairs of S5. S1–2 about 1.1 mm exsert, having slightly sinuous inner edges that extend about half distance to columella. Each S1–2 bears 1–3 small paliform lobes positioned low in fossa near the columella. S3 about 0.9 mm exsert and 3/4 width of the S1–2, each bearing one large paliform lobe that rises higher in the fossa than the P1–2. S4 about 3/4 width of the S3, having lacinate inner edges. If pairs of S5 are present, the flanked S4 bears a P4. Sparse endothecal dissepiments present. Fossa deep, containing a well-developed trabecular columella.

Remarks

Among the six previously described species in the genus, *R. multipalifera* is most similar to *R. sagamiensis* (Eguchi, 1968), but differs by having well-developed paliform lobes before the S1–2 as well as the S3. In this character *R. multipalifera* differs from all other *Rhizosmilia* and is only tentatively placed in the genus.

Distribution

Western Australia: continental shelf of southwestern coast from Cape Jaubert to north of Perth; 11–165 m.

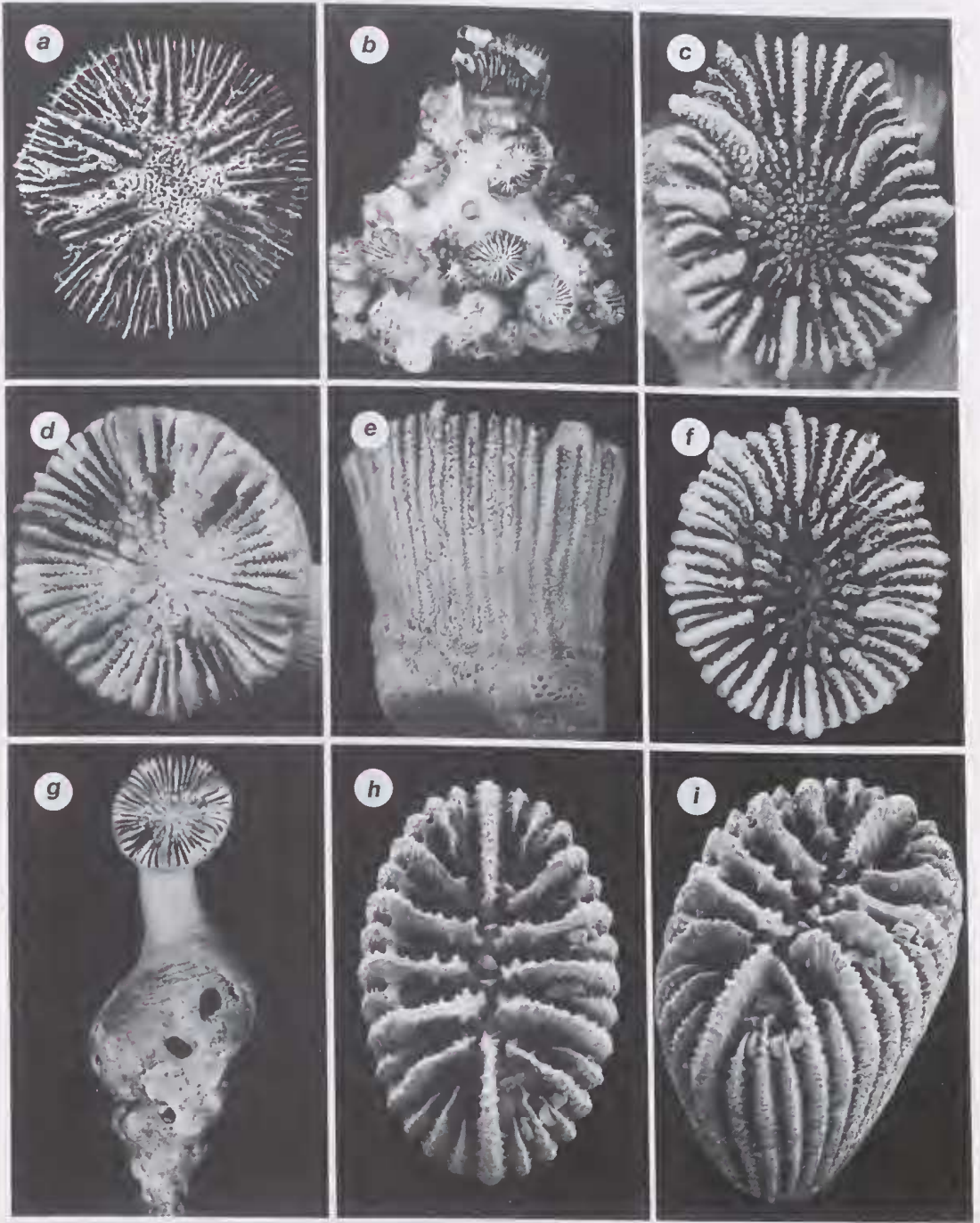


Figure 4 a, *Deltocyathus magnificus*, Soela stn 01/84/120, WAM 701-84, columella deformed by ascithoracidan crustacean gall, x 1.7. b-c, *Rhizosmilia* *multipalifera*: b, paratype colony, Sprightly stn 41M, WAM 129-83, x 1.5; c, calice of holotype, x 7.3; e-f, *Paracyathus porphyreus* of Folkeson (1919), SMNH 223, side and calicular views, x 8.3. d, g, *Paracyathus* *?fulvus*, Soela stn 01/84/54, WAM 21-85, calicular view and corallum as attached to gastropod, x 4.4, x 1.7, respectively. h-i, *Trematotrochus verconis*, west of Eucla, USNM 85714, calicular and oblique views, x 19.

Etymology

The species name *multipalifera* (Latin *multus*, many + *paliferus*, bearing stakes (pali)) refers to the numerous paliform lobes in this species.

Genus *Solenosmilia* Duncan, 1873

Solenosmilia variabilis Duncan, 1873

Solenosmilia variabilis Duncan, 1873: 328, pl. 42, figs. 11–18.—Hoffmeister, 1933: 14, pl. 4, fig. 7.—Cairns and Parker, 1992: 29–30, pl. 8, figs. d–e (diagnosis).—Cairns, 1995: 82, pl. 23, figs. d–e (synonymy).

New Records

Longva III: stn "1", SAM; stn "2", SAM.

Distribution

Western Australia: western Great Australian Bight; 963–1011 m. Elsewhere: widespread in Atlantic and Indian Oceans; New Zealand region; southeastern Australia; 220–2165 m (Cairns 1995).

Family Turbinoliidae Milne Edwards and Haime, 1848a

Genus *Trematotrochus* Tenison Woods, 1879

Trematotrochus verconis Dennant, 1904

Figures 4 h–i, 5 a–c

Trematotrochus verconis Dennant, 1904: 5–6, pl. 1, fig. 4a.—Cairns and Parker, 1992: 30–31, pl. 9, figs. a, e (synonymy and description).

?*Trematotrochus lateroplenus* – Wells, 1942: 95–96.

New Records

Sprightly: stn 28M, 1, WAM 361–79.

Other records: Verco collection, 146 km west of Eucla, 148 m, III 1912, 4, including SEM stub 856, USNM 85714.

Remarks

These small specimens indicate that at a GCD of 3.5–3.8 mm the total number of septa increases from 32 to 40.

Although not examined, the Miocene fossil reported by Wells (1942) from the Langley Park Bore may be this species.

Distribution

Western Australia: off Dongara and Eucla, southwestern coast; 148–183 m. Elsewhere: South Australia; 73–101 m (Cairns and Parker 1992).

Genus *Conocyathus* d'Orbigny, 1849

Conocyathus zelandiae Duncan, 1876

Figure 5 d–h

Conocyathus zelandiae Duncan, 1876: 431, pl. 38, figs.

1–3.—Wells, 1964: 112–114 (part).—Cairns, 1995: 83–84, in part: pl. 23, figs. f–i (not specimens from *Alpha Helix* stations) (synonymy and description).—Not Cairns and Zibrowius, 1997: 140–141 (= *C. gracilis*).

Not *Trematotrochus zelandiae* – Folkesson, 1919: 14 (= *C. gracilis*).

Turbinolia australiensis Gardiner, 1939: 332–333, pl. 21, figs. 1–2.

New Records

Espirito Santo: stn E68–743, 1, AMS G15361.

Other records: Stn Cwc, Withnell Bay, Burrup Peninsula, Dampier Archipelago, 4 m, 1 (SEM stub 854), WAM 379–88; Verco collection, King George Sound, 22–26 m, 10: 2, including SEM stub 520 (USNM 85713); 8 (SAM H502).

Distribution

Western Australia: King George Sound and Dampier Archipelago; 4–137 m. Elsewhere: Persian Gulf; ?New Zealand; New South Wales; 130 m.

Conocyathus gracilis sp. nov.

Figures 5 i, 6 a–d

Trematotrochus zelandiae – Folkesson, 1919: 14.

Conocyathus zelandiae – Wells, 1964: 113–114 (in part).—Cairns, 1995: 83 (in part: specimens from *Alpha Helix* stations).—Cairns and Zibrowius, 1997: 140–141.

Records

Soela: stn 01/79/unnumbered, holotype (SEM stub 855), WAM 31–85.

Alpha Helix: stn M14, 7 paratypes, USNM 80852; KARUBAR: stn 44, 4 paratypes, USNM 97320; stn 86, 1 paratype, MNHN.

Other records: off Broome, from stomach of fish, 5 paratypes, SMNH 148 (Mjoberg 1911 collection, *T. zelandiae* of Folkesson 1919).

Type Locality

19°34.5'S, 116°08'E (off Glomar Shoal, NW of Dampier Archipelago); 101 m.

Description

Corallum elongate, slender, and very small, the largest specimen (holotype) 1.55 mm in calicular diameter and 4.75 mm in height. Calice circular, with a H:D ratio of 3.1. All costae (C1–3) equal in width (70–80 µm) and separated by broad intercostal regions 100–125 µm wide. C1–2 extend to base, whereas C3 originate 0.85–1.0 mm above base, and incipient C4 just begin to form on holotype at a height of 4.6 mm. C4 do not correspond to septa. Intercostal region of lower

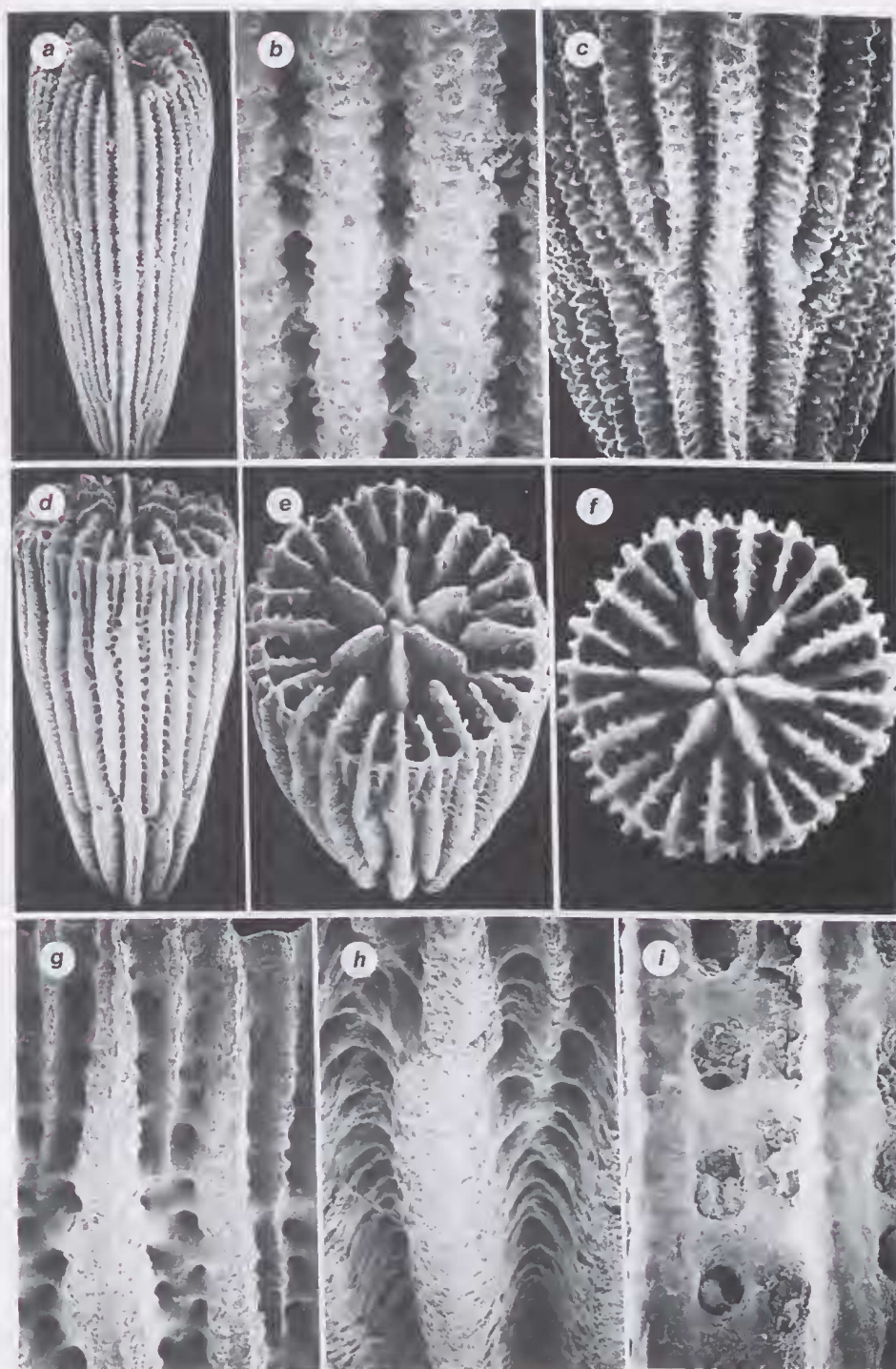


Figure 5 a-c, *Trematotrochus verconis*, west of Eucla, USNM 85714: a, edge view, x 12.6; b, costae and intercostal perforations, x 76; c, trifurcation of higher cycle costae, x 53. d-h, *Conocyathus zelandiae*, Dampier Archipelago, WAM 379-88: d-f, side, oblique, and calicular views, x 23, x 30, x 36, respectively; g, upper theca showing supernumerary costae, x 97; h, enlargement of intercostal pits, x 150. i, *Conocyathus gracilis*, holotype, intercostal pits, x 150.

half of corallum bears a unilinear row of shallow circular to slightly elliptical pits, each about 50 µm in diameter. In upper half of corallum, pits arranged in 2 staggered rows, separated by a thecal midline (Figure 6d). Septa hexamerally arranged in 3 complete cycles (S1>S2>S3). S1 about 0.22 mm exsert, having straight axial edges that extend about half distance to columella in upper fossa but join to the columella lower in fossa. S2 equally exsert and about 3/4 width of the S1, each bearing a broad, low paliform lobe the inner edge of which fuses to the columella. S3 relatively narrow (about 0.1 mm wide), the upper edges of each pair that flank an S2 fusing to the S2 at calicular edge (forming small lancets) and axial edges of each S3 angled toward and fusing to its adjacent S2 via 2 or 3 trabecular processes. Fossa of moderate depth; columella a solid central fusion of inner edges of S1 and P2.

Remarks

Conocyathus gracilis is similar to and has been confused with *C. zelandiae*, but is distinguished by having a smaller, narrower corallum (GCD max. 1.7 mm and H:D = 3.1 vs GCD max. 3.4 mm and H:D = 1.8); having much less exsert P2 (those of *C. zelandiae* extend above the calicular edge); having only 24 costae, the C4 of *C. zelandiae* beginning to form at a height of 1.9–2.7 mm; having broader intercostal region than costae, the reverse being true for *C. zelandiae*; and in having uniformly wide C1–2 that do not change width at the origin of the C3.

Distribution

Western Australia: known only from continental shelf of northwestern coast off Broome and Glomar Shoal; 101 m. Elsewhere: Arafura Sea (off Arnhem Land, Northern Territory); 22–291 m.

Etymology

The species name *gracilis* (Latin *gracilis*, slender) alludes to the slender corallum of this species, which helps to distinguish it from *C. zelandiae*.

Genus *Alatotrochus* Cairns, 1994

Alatotrochus rubescens (Moseley, 1876)

Platyrochus rubescens Moseley, 1876: 553.

Sphenotrochus rubescens – Moseley, 1881: 157–159, pl. 6, figs 8, 8a.

Alatotrochus rubescens – Cairns, 1994: 68–69, pl. 29, figs g–l (synonymy); 1995: 84, pl. 24, figs. a–b.—Cairns and Zibrowius, 1997: 141–142, fig. 18 h.

New Records

Lady: stn RW96–17, 3: 2 (NTM C8069 and C8074),

1 (USNM 98515); stn RW96–18, 1 (NTM); stn RW96–19, 1 (NTM C8084).

Distribution

Western Australia: south of Cartier Island; 180–350 m. Elsewhere: western Pacific from Japan to southern Norfolk Ridge; 187–751 m (Cairns and Zibrowius 1997).

Genus *Idiotrochus* Wells, 1935

Idiotrochus kikutii (Yabe and Eguchi, 1941)

Placotrochides kikutii Yabe and Eguchi, 1941: 104.

Idiotrochus kikutii – Cairns, 1989: 36–37, pl. 18, figs. a–b, d–h (synonymy and description); 1994: 69, pl. 30, figs. a–d.—Cairns and Zibrowius, 1997: 148–149.

New Record

Soela: stn 02/82/13A, 3, WAM 90– and 96–84.

Distribution

Western Australia: continental slope of northwestern coast off Port Hedland; 201 m. Elsewhere: western Pacific from Japan through Indonesia; 97–645 m (Cairns and Zibrowius 1997).

Genus *Notocyathus* Tenison Woods, 1880

Notocyathus venustus (Alcock, 1902b)

Citharocyathus venustus Alcock, 1902b: 119.

Notocyathus venustus – Cairns, 1989: 27–28, pl. 12, figs. c–h (synonymy and description); 1994: 64, pl. 27, figs. k–l.—Cairns and Zibrowius, 1997: 143.

New Records

Soela: stn 01/79/unnumbered, 2, WAM 32–85.

Umataka Maru: stn 6921, 10: 7 (WAM 150–84 and 325–89), 3 (USNM 97010); stn 6927, 1, WAM 103–84.

MV Kos 2: stn K67–182, 14°12'S, 123°02'E, 194 m, 1, AMS G15353.

Lady: stn RW96–17, 1, NTM C8072.

Distribution

Western Australia: northwestern coast from Cartier Island to off Glomar Shoal; 90–300 m. Elsewhere: western Pacific from southern Japan through Indonesia; 70–555 m (Cairns and Zibrowius 1997).

Genus *Tropidocyathus* Milne Edwards and Haime, 1848a

Tropidocyathus lessonii (Michelin, 1842)

Flabellum Lessonii Michelin, 1842: 119.

Tropidocyathus lessonii – Cairns, 1989: 33–34, pl. 16, figs. d–l (synonymy and description); 1994: 67,

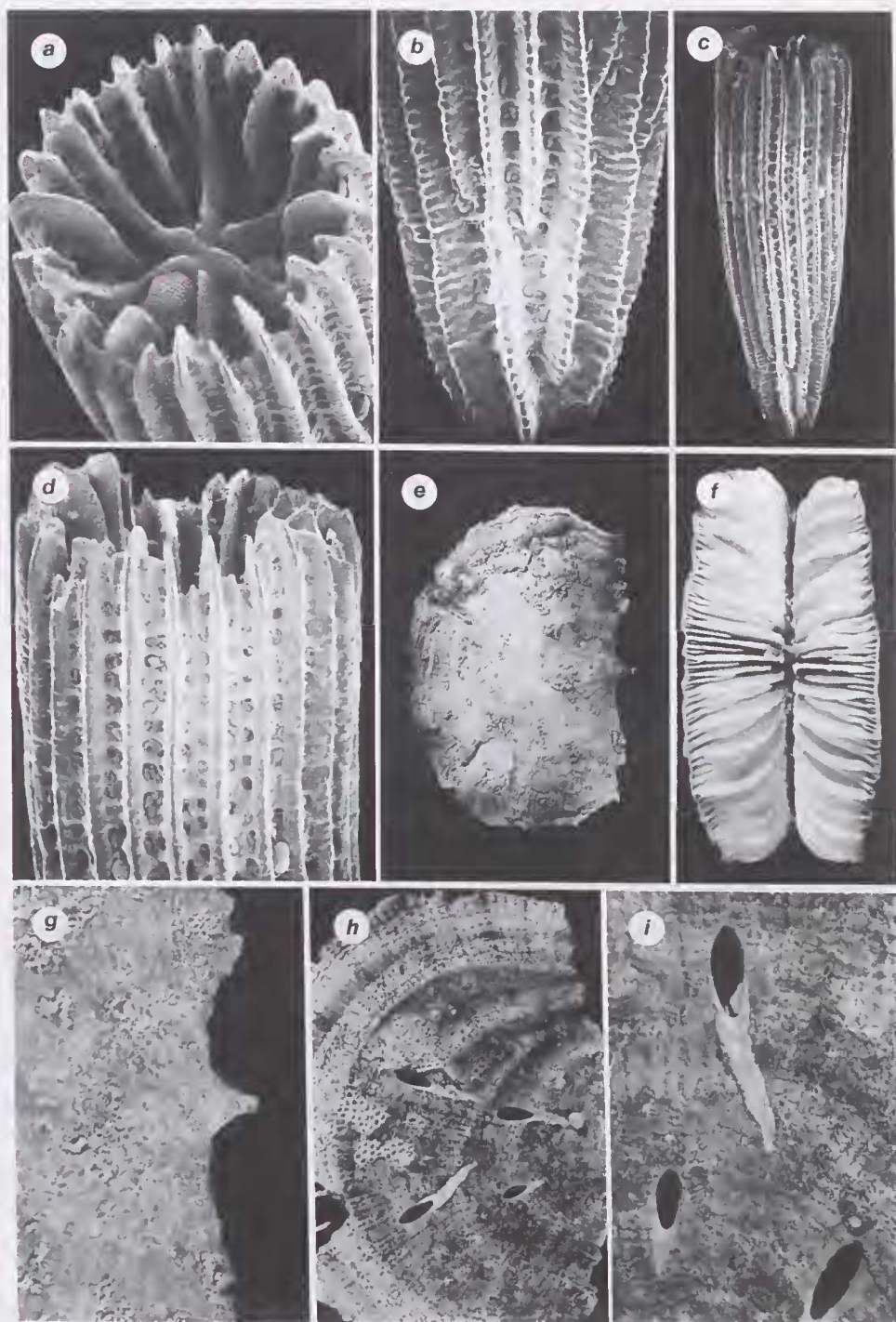


Figure 6 a-d, *Conocyathus gracilis*, holotype: a, oblique calicular view, x 37; b, base of corallum showing independent costal insertion, x 44; c, side view of corallum, x 15; d, intercostal pits, x 37. e-f, *Flabellum folkesoni*, e-g, holotype: e-f, side and calicular views, x 1.2, x 1.4, respectively; g, enlargement of pedicel and adjacent thecal edges, x 3.0; h-i, *Lady Basten* stn LB5(s), WAM 27-96, specimen infested with acrothoracican cirripedes, x 2.9, x 6.5, respectively.

pl. 29, figs. a–b.—Cairns and Zibrowius, 1997: 146–147.

New Records

Diamantina: stn 185, 1, WAM 175–83.

Lady Basten: stn LB5(s), 1, WAM 29–96.

Espiritu Santo: stn E68–743, 2, AMS G15362.

Other records: Port Essington, Cobourg Peninsula, Northern Territory, 1, NTM C8037.

Distribution

Western Australia: from Port Hedland to off Point Cloates; 137–160 m. Elsewhere: Indo-West Pacific (southwestern Indian Ocean to southern Japan); 50–421 m (Cairns and Zibrowius 1997).

Tropidocyathus labidus Cairns and Zibrowius, 1997

"Tropidocyathus" labidus Cairns and Zibrowius, 1997: 148, figs. 20 a–g.

New Records

Umataka Maru: stn 6921, 4, WAM 145, and 151–84; stn 6930, 1, USNM 97011.

Distribution

Western Australia: continental slope of northwestern coast from Browse Island to Rowley Shoals; 300–380 m. Elsewhere: Indonesia; Ryukyu Islands; 206–425 m (Cairns and Zibrowius 1997).

Genus *Cyathotrochus* Bourne, 1905

Cyathotrochus pileus (Alcock, 1902a)

Trochocyathus pileus Alcock, 1902a: 96–97.

Tropidocyathus pileus – Cairns, 1989: 34–35, pl. 17, figs. a–h (synonymy and description); 1994: 68, pl. 29, figs. d–5; 1995: 91, pl. 28, figs. a–c.

"Tropidocyathus" pileus – Cairns and Zibrowius, 1997: 147–148, figs. 19 h–i.

New Records

Soela: stn 01/84/54, 2, WAM 267– and 268–93; stn 01/84/55, 3: 2 (WAM 559–84), 1 (USNM 97012); stn 01/84/74, 2, WAM 532–84.

Umataka Maru: stn 6921, 2, WAM 144–84.

Franklin: stn GAB042, 1, SAM H873.

Lady Basten: stn LB8(t), 1, WAM 49–96.

Distribution

Western Australia: continental slope of northwestern coast from Browse Island to Rowley Shoals; Great Australian Bight; 234–348 m. Elsewhere: Indo-West Pacific (southwestern Indian Ocean to Japan, including Queensland and Norfolk Ridge); 123–522 m (Cairns and Zibrowius 1997).

Genus *Deltocyathoides* Yabe and Eguchi, 1932

Deltocyathoides orientalis (Duncan, 1876)

Deltocyathus orientalis Duncan, 1876: 431, pl. 38, figs. 4–7.

Peponocyathus orientalis – Veron, 1986: 608.

Peponocyathus australiensis – Cairns, 1989: 29, 30–32, pl. 14, figs. d–j, pl. 15, figs. a–d (synonymy and description).—Cairns and Parker, 1992: 39–40, pl. 13, figs. c–d.—Cairns, 1994: 64–65, pl. 28, figs. c–f, pl. 41, fig. i.

Deltocyathoides orientalis – Cairns and Zibrowius, 1997: 144–145.

New Record

Umataka Maru: stn 6920, 3, WAM 326–89.

Distribution

Western Australia: south of Rowley Shoals; 260 m. Elsewhere: Indo-West Pacific (southwestern Indian Ocean to Japan, including South Australia and Queensland); 44–635 m (Cairns and Zibrowius 1997).

Superfamily Flabelloidea Bourne, 1905

Family Guyniidae Hickson, 1910

Genus *Guynia* Duncan, 1872

Guynia annulata Duncan, 1872

Guynia annulata Duncan, 1872: 32, pl. 1, figs. 1–8.—Cairns, 1989: 42–43, pl. 21, fig. f, pl. 22, figs. a–e (synonymy and description).—Cairns and Parker, 1992: 42–43, pl. 14, figs. g–h.—Cairns and Zibrowius, 1997: 150.

New Record

Espiritu Santo: stn E68–743, 3, AMS G15273.

Distribution

Western Australia: known only from continental shelf near Glomar Shoal; 137 m. Elsewhere: cosmopolitan in tropical and warm temperate regions, except for eastern Pacific, including off South Australia; 28–653 m (Cairns and Zibrowius 1997).

Family Flabellidae Bourne, 1905

Genus *Flabellum* Lesson, 1831

Subgenus *Flabellum* Lesson, 1831

Flabellum (F.) *magnificum* Marenzeller, 1904

Flabellum magnificum Marenzeller, 1904: 276–277, pl. 17, fig. 13.—Cairns, 1989: 50–51, pl. 25, figs. a–j (synonymy and description).—Grygier, 1991: 43, fig. 21H.—Cairns, 1994: 72, pl. 31, figs. j–l.—Cairns and Zibrowius, 1997: 151–152.

New Records

Soela: stn 02/82/17, 1, WAM 23-83; stn 02/82/18, 1, WAM 24-83; stn 02/82/31, 1, WAM 29-83; stn 02/82/43, 1, WAM 42-83; stn 02/82/46, 1, WAM 43-83; 01/84/54, 1, WAM 438-96; stn 01/84/59, 1, WAM 572-84; stn 01/84/60, 1, WAM 573-84; stn 01/84/67, 13: 8 (WAM 769-84), 5 (USNM 97013); stn 01/84/71, 1, WAM 537-84; stn 01/84/77, 1, WAM 525-84; stn 01/84/119, 2, WAM 784-84; stn 01/84/121, 1, WAM 401-86; stn 01/84/122, 2: 1 (WAM 728-84), 1 (USNM 97014); stn 04A/82/8B, 2, WAM 46-83.

Courageous: stn 003, 3, WAM 40-84; stn 015, 2, WAM 39-84; stn 017, 1, WAM 34-84; stn 018, 2, WAM 35-84; stn 026, 5: 3 (WAM 41-84), 2 (USNM 97015).

Lady: stn RW96-31, 3: 2 (NTM C8092); 1 (USNM 98516).

Distribution

Western Australia: continental slope of northwestern coast from near Browse Island to off Port Hedland; 306-506 m; 7.8°-12.0°C; soft (muddy) substrates. Elsewhere: western Pacific from Japan through Indonesia, and western Sumatra; 225-700 m (Cairns and Zibrowius 1997).

Flabellum (F.) lamellulosum Alcock, 1902a

Flabellum lamellulosum Alcock, 1902a: 105-106.—Cairns, 1989: 52-53, pl. 27, figs. a-l (synonymy and description).—Cairns and Zibrowius, 1997: 152-153, fig. 21 a.

New Records

Soela: stn 02/82/38, 1, WAM 111-83; stn 02/82/41, 1, WAM 40-83; stn 02/82/45, 1, WAM 41-83; stn 01/84/54, 8: 5 (WAM 552-84), 3 (USNM 97017); stn 01/84/55, 1, WAM 554-84; stn 01/84/56, 1, WAM 563-84; stn 01/84/65, 1, WAM 665-84; stn 01/84/66, 1, WAM 667-84; stn 01/84/67, 1, WAM 743-84; stn 01/84/74, 1, USNM 97018; stn 01/84/122, 1, WAM 439-96; stn 04A/82/8A, 2, WAM 45-83; stn 04/82/8C, 1, WAM 44-83.

Courageous: stn 003, 3, WAM 440-96; stn 020, 1, USNM 97016.

Umataka Maru; stn 6930, 1, WAM 261-93.

Lady: stn RW96-18, 13: 10 (NTM C8081), 3 (USNM 98514).

Distribution

Western Australia: continental slope of northwestern coast from south of Cartier Island to Port Hedland; 280-450 m; 9.1°-10.0°C; soft (muddy) substrates. Elsewhere: western Pacific from South China Sea through Indonesia; 187-486 m (Cairns and Zibrowius 1997).

Flabellum (F.) patens Moseley, 1881

Flabellum patens Moseley, 1881: 172 (in part: pl. 6, fig. 15).—Cairns, 1989: 51-52, pl. 26, figs. a-i (synonymy); 1994: 71-72, pl. 31, figs g-i.—Cairns and Zibrowius, 1997: 152, fig. 20 i.

New Record

Lady: stn RW96-18, 1, NTM C8078.

Distribution

Western Australia: continental slope south of Cartier Island; 280 m. Elsewhere: western Pacific from Japan through Indonesia; 204-439 m (Cairns and Zibrowius 1997).

Flabellum (F.) folksoni sp. nov.

Figure 6 e-i

Records

Other records: unknown station "between Shark Bay and Onslow", coll. W. and W. Poole, 1966, depth not known, holotype (WAM 173-83) and 23 paratypes (WAM 170-83 and 260-93).

Soela: stn 01/18, 1 paratype, WAM 212-92; stn 02/82/9, 5 paratypes: 2 (WAM 98-83), 3 (USNM 97019); stn 04B/82/74, 1 paratype, WAM 609-88; stn 05/82/47, 1 paratype, WAM 62-83.

Lady Basten: stn LB4(s), 1 paratype, WAM 12-96; stn LB5(s), 27 paratypes: 26 (WAM 27-96), 1 (USNM 96586); stn LB5(t), 21 paratypes: 18 (WAM 23-96), 3 (USNM 97020); stn LB6(s), 6 paratypes, WAM 40-96; stn LB6(t), 1 paratype, WAM 38-96.

Type Locality

"Between Shark Bay and Onslow, WA"; depth unknown.

Description

Angle of thecal edges 180°-210°; angle of thecal faces 27°-30°. Corallum robust and dense; one of largest specimens (the holotype) measures 42.3 x 22.5 mm in calicular diameter and 35.6 mm in height. GCD:H = 0.92-1.19. Pedicel short (3.3-3.6 mm) and small (only 1.1-1.2 mm in diameter). Thecal faces flat, usually encrusted with calcareous epifauna, but glisteny (not granular); well-preserved coralla bear thin reddish-brown stripes corresponding to the S1-6. Thecal faces meet in sharp, carinate edges, forming irregular spurs, as in *F. lamellulosum*, which result from successive downward eversions of the two principal costae followed by subsequent retrenchment of the calicular edge. Septa hexamerally arranged in 7 cycles, the seventh only partially complete in the holotype (274 septa); septa formula: S1-4>S5>S6>S7. Inner edges of S1-4 highly sinuous (SSI about 4.0), occurring closely parallel to edges of S1-4 from opposing face. Upper edges of S1-4

notched near calicular edge (SCI only about 4.3). S5 about 2/3 width of S1–4 and thus easily distinguishable from them; only slightly sinuous. S6 about half width of S5, and when present, S7 rudimentary, composed of a series on low spines occurring only near calicular edge of larger specimens. Fossa deep and narrow (1.5–2.0 mm in width), containing a low, crispate columella.

Remarks

Flabellum folkesoni is similar to *F. lamellulosum*, particularly regarding thecal edge angle, edge ornamentation, and septal formula, but can be distinguished by having highly sinuous axial edges of the S1–4, a smaller pedicel, a narrower face angle, a denser corallum, and smaller S5 in relation to the S1–4. *F. folkesoni* is also found in shallower, warmer waters than *F. lamellulosum*.

Flabellum folkesoni might also be confused with *Truncatoflabellum angiosotum*, which occurs in the same region at similar depths, both species being similarly shaped and about the same size. However, *T. angiosotum* can be distinguished by having straight inner edges of the S1–4; a small truncated base flanked by two thecal edge spines; rounded thecal edges; differently shaped septa; and an edge angle that is usually less than 180°.

Characteristically-shaped (Figs 6h–i) acrothoracican cirripede burrows were found in the coralla from four of the stations listed above, some coralla having as many as 14 burrows on one thecal face. Crescent grooves of commensal lumbrinerid polychaetes were also found on coralla from half of the stations listed above (see Zibrowius, Southward and Day 1975).

Distribution

Western Australia: continental shelf of northwestern coast from Rowley Shoals to Onslow Bay and perhaps as far south as Shark Bay; 124–173 m; 19°–22.8°C.

Etymology

This species is named in honour of Folke Folkeson, who described several new azooxanthellate species from Western Australia (Folkeson 1919).

Flabellum (F.) politum Cairns, 1989

Flabellum politum Cairns, 1989: 53–54, pl. 28, figs. a–f (synonymy and description); 1994: 73, pl. 32, figs. a–c.—Cairns and Zibrowius, 1997: 153–154.

New Records

Soela: stn 02/82/10A, 1, WAM 48–84; stn 02/82/13A, 15: 11 (WAM 55–84), 4 (USNM 96588); stn

01/84/85, 1, WAM 682–84; stn 05/82/36, 1, WAM 58–83.

Umataka Maru: stn 6920, 3, WAM 130–84.

Lady Basten: stn LB1b(s), 2, WAM 9–96; stn LB5(s), 59, WAM 25–96; stn LB5(t), 16, WAM 21–96; stn LB6(s), 2, WAM 43–96.

Remarks

Acrothoracican cirripede burrows were present on the theca of specimens from half of the stations reported above, usually with an infestation rate of 2 or 3 per corallum.

Distribution

Western Australia: continental shelf of northwestern coast from south of Scott Reef to Port Hedland; 45–220 m; 23.1° C; soft (muddy) substrates. Elsewhere: Ryukyu Islands through Indonesia; 40–402 m (Cairns and Zibrowius 1997).

Subgenus *Ulocyathus* Sars, 1851

Flabellum (U.) hoffmeisteri Cairns and Parker, 1992

Flabellum hoffmeisteri Cairns and Parker, 1992: 47–48, pl. 16, figs. d–f.—Cairns, 1995: 103–104, pl. 33, figs. g–h (synonymy and description).—Cairns and Zibrowius, 1997: 157–158.

New Records

Soela: stn 01/84/24, 1, NMV F78391; stn 01/84/51, 1, WAM 539–84; stn 01/84/52, 2, WAM 545–84; stn 01/84/53, 2, WAM 568– and 569–84; stn 01/84/59, 2, WAM 570– and 571–84; stn 01/84/63, 1, WAM 740–84; stn 01/84/64, 13: 9 (WAM 582–84), 4 (USNM 96595); stn 01/84/65, 3, WAM 664–84; stn 01/84/66, 3, WAM 666–84; stn 01/84/67, 11: 7 (WAM 745–84), 4 (USNM 96638); stn 01/84/71, 1, WAM 538–84; stn 01/84/77, 2, WAM 523–84; stn 01/84/81, 1, WAM 675–84; stn 01/84/91, 1, WAM 687–84; stn 01/84/116, 3, WAM 698–84; stn 01/84/119, 2, WAM 782– and 783–84; stn 01/84/120, 7, WAM 805–84; stn 01/84/121, 3, WAM 781–84; stn 02/82/17A, 2, WAM 106–83; stn 02/82/35, 1, WAM 110–83; stn 04A/82/8B, 1, WAM 85–83.

Courageous: stn 002, 8, WAM 26–84; stn 003, 8: 6 (WAM 24–84), 2 (USNM 96591); stn 004, 1, WAM 37–84; stn 015, 6, WAM 36–84; stn 022, 1, WAM 32–84; stn 023, 2, WAM 30–84; stn 090, 1, WAM 33–84.

Remarks

Flabellum hoffmeisteri is most similar to *F. tuthilli*, but can be distinguished by having lower calicular apices; a more elongate corallum with ridged primary costae that reach almost to the calicular edge; striped costae; and less septa at an equivalent

GCD, a full fourth cycle of 128 septa occurring only in the very largest (GCD = 60 mm) *F. hoffmeisteri* but already present in medium-sized coralla (GCD 36 mm) of *F. tuthilli*. Also, although found at the same depth range, the two species overlap in distribution only off western Tasmania, most of the records of *F. tuthilli* being from the Great Australian Bight, where *F. hoffmeisteri* has not been collected.

Distribution

Western Australia: continental slope of northwestern coast from Cartier Island to Port Hedland; 302–544 m; soft (muddy) substrates. Elsewhere: Indonesia; Kermadec and Colville Ridges; off Victoria and Tasmania; 110–646 m (Cairns and Zibrowius 1997).

Flabellum (U.) tuthilli Hoffmeister, 1933

Flabellum tuthilli Hoffmeister, 1933: 7–8, pl. 1, figs. 3–5.—Cairns and Parker, 1992: 46–47, pl. 16, figs. a–c (synonymy and description).

New Record

Saxon Progress: stn RP–8, 1, NMV F78389.

Remarks

The specimen reported above is the largest known, measuring 50.5 × 37.6 mm in calicular diameter and 33.9 mm in height, and having 128 septa.

Distribution

Western Australia: continental slope of southern coast (Great Australia Bight from Bremer Bay to South Australia); 347–550 m. Elsewhere: Great Australia Bight off South Australia to western Tasmania; 348–824 m (Cairns and Parker 1992).

Flabellum (U.) marenzelleri Cairns, 1989

Flabellum marenzelleri Cairns, 1989: 57–58, pl. 30, figs. a–e (synonymy and description).—Cairns and Zibrowius, 1997: 156.

New Records

Soela: stn 01/84/54, 1, USNM 96639; stn 01/84/55, 1, WAM 557–84; stn 01/84/87, 1, WAM 684–84.

Lady: stn RW96–18, 12: 10 (NTM C8080), 2 (USNM 98512).

Distribution

Western Australia: continental slope of northwestern coast south of Cartier Island and off Dampier Land; 260–348 m. Elsewhere: Philippines and Indonesia; 240–390 m (Cairns and Zibrowius 1997).

Flabellum (U.) deludens Marenzeller, 1904

Flabellum deludens Marenzeller, 1904: 269–272, pl. 17, figs. 10, 10a.—Cairns, 1989: 55–56, pl. 29, figs. a–f (synonymy and description); 1994: 73, pl. 32, figs. d–e.—Cairns and Zibrowius, 1997: 154–156.

New Records

Soela: 02/82/10B, 1, WAM 99–83; stn 01/84/67, 1, WAM 441–96.

Distribution

Western Australia: continental slope of northeastern coast from Scott Reef to Port Hedland; 348–360 m. Elsewhere: Indo-West Pacific (northern Indian Ocean through Indonesia to Japan); 106–1035 m (Cairns and Zibrowius, 1997).

Genus *Truncatoflabellum* Cairns, 1989

Truncatoflabellum angiosomum (Folkesson, 1919) comb. nov.

Figures 7a–c, 8a

Flabellum angiosomum Folkesson, 1919: 5, pl. 1, figs. 1–3.—Not Cairns, 1995: 99, pl. 32, figs. d–f (=new species, Cairns, in press).

Truncatoflabellum spheniscus – Cairns and Zibrowius, 1997: 165–166 (in part: figs. 23 a–b; KH72–1–29 and 30).

New Records

Soela: stn 02/82/54A, 1, WAM 36–83; stn 04B/82/71, 1, WAM 344–89; stn 05/82/13, 3: 2 (WAM 51–83), 1 (USNM 96640); stn 05/82/61, 1, WAM 76–83; stn 05/82/63, 1, WAM 78–83.

Dorothea: 64 km W Cape Jaubert, 40 m, 13 X 1962, 4: 2 (WAM 254–93), 2 (USNM 96643); 57 km SW Adele Island, 73 m, 17 X 1962, 3, WAM 255–93; 208 km ENE Troughton Island, 91 m, 23 X 1962, 1, WAM 256–93.

Kimmunya: stn BG13, 2, NTM C8000; stn BG27, 3, NTM C8044; stn BG28, 3, NTM C8045; stn BG39, 1, NTM C8048; stn BG83, 2, NTM C8026.

Lady Basten: stn LB3(t), 1, WAM 10–96.

Lady: stn RW96–5, 7, NTM C8063.

Other records: Middle Pass, Darwin, 20 m, 28 XI 1994, 1, NTM C12333.

Description

Angle of curved, rounded thecal edges 105°–200°, but usually about 180°; angle of thecal faces 15°–25°. Holotype 45.2 × 14.7 mm in calicular diameter and 34.2 mm in height, with a basal scar 4.3 × 3.3 mm in diameter; however, largest known specimen (NTM C12333) 63.3 × 19.9 mm in calicular diameter and 42.1 mm in height. Upper calice strongly arched in a semi-circle; GCD:LCD =

3.0–3.2. Basal scar small and elliptical: 2.8–4.3 x 2.5–3.3 mm in diameter. One pair of short, downward projecting thecal edge spines occurs within 2–3 mm of basal scar. Edge spines usually only apparent on small specimens, those of larger coralla often breaking off and their stubs covered by encrusting organisms. Thecal faces usually highly encrusted with calcareous epifauna, including: bivalves, serpulids, barnacles, bryozoa, foraminifera, and acrothoracican cirripede borings. Theca otherwise white. Septa hexamerally arranged in 6 and often a partial 7th cycle in larger coralla according to the formula: S1–4>S5>S6>S7. S7 begin to appear at a GCD of 30–33 mm; the holotype (GCD = 45.2) has a complement of 50:50:100:68 (268 septa); and larger coralla increase the number of equally large primary septa to 66. The shape of the primary septa (S1–4) is complex. Within 0.3–0.4 mm of the calicular edge these septa are notched, below which they broaden into a wide lobe that often rises slightly above the calicular edge. Midway to columella the axial edge of an S1–4 is slightly concave, but nearer the columella the septum widens. Inner edges of S1–4 straight and thin except near the columella, where they thicken. S5 only about 1/3 width of S1–4 near the calicular edge, but about 4/5 width of S1–4 lower in fossa. S6 about half width of S5. S7 same width as S6 but do not extend as far downward from calicular edge. Fossa deep and elongate, containing a trabecular columella about 1.5 mm wide.

Remarks

Because of my previous confusion in identifying this species, a complete description is provided above, based on the holotype and additional specimens from the same region. Comparisons to *T. spheniscus* are made in the account of that species and in Table 4.

Although not apparent from the original description, the base of the holotype bears a natural scar resulting from transverse division, and the remnants of two thecal edge spines, which clearly places this species in *Truncatoflabellum*.

Distribution

Western Australia: continental shelf of northwestern coast from Joseph Bonaparte Gulf to Nickol Bay; 22–136 m; 23.9° to 28.8°C; sandy, shelly substrates. Elsewhere: Northern Territory (Beagle Gulf and Anson Bay); 15–115 m; sand and gravel substrates.

Truncatoflabellum formosum Cairns, 1989

Truncatoflabellum formosum Cairns, 1989: 69–70; 1994: 77, pl. 33, figs. g–h.—Cairns and Zibrowius, 1997: 169–170.

New Records

Lady Basten: stn LB5(s), 8, exWAM 24–96; stn LB6(s), 1, WAM 44–96.

Remarks

Among the Western Australian *Truncatoflabellum*, *T. formosum* is most similar to *T. australiensis*, but can be distinguished (Table 4) by having a slightly smaller basal scar, and decamerally arranged septa, which results in 80, instead of 96 septa.

Most (7 of 9) of the specimens reported above bear up to seven thecal burrows of acrothoracican cirripedes.

Distribution

Western Australia: continental shelf of northwestern coast southwest of Rowley Shoals; 160–173 m. Elsewhere: ?Indian Ocean; western Pacific from Japan through Indonesia; 42–933 m (Cairns and Zibrowius 1997).

Truncatoflabellum australiensis sp. nov.

Figures 7 d–f, 8 b

Records

Other records: “between Shark Bay and Onslow”, depth unknown, coll. W. and W. Poole, 1966, holotype, WAM 169–83, and 5 paratypes, WAM 171– and 172–83 and 442–96.

Soela: stn 05/82/37, 2 paratypes, WAM 59–83; stn 05/82/42, 1 paratype, WAM 61–83; stn 05/82/47, 2, WAM 63– and 66–83.

Umataka Mari: stn 6927, 2 paratypes, WAM 102–84.

Sprightly: stn 34M, 1 paratype, WAM 134–83.

Diamantina: stn 208, 2 paratypes, WAM 224– and 225–93.

Lady Basten stn: LB5(s), 19 paratypes, WAM 24–96.

W.A. Hawaiian Expedition: 16–32 km NNW Anchor Island, 119 m, 17 VI 1960, 9 paratypes: 6 (WAM 144–83, 231– and 259–93), 3 (USNM 96652).

Lady: stn RW96–17, 1 paratype, NTM C8070.

Type Locality

“Between Shark Bay and Onslow, WA”; depth unknown.

Description

Anthocyathus: Angle of thecal edges 44°–73°; angle of thecal faces 18°–28°. Holotype 21.9 x 10.8 mm in calicular diameter and 17.9 mm in height, with a basal scar 7.1 x 3.5 mm in diameter; largest specimen 25 mm in GCD. Upper calicular edge only slightly arched: GCD:LCD = 1.95–2.35. Basal scar elliptical and of moderate size, its greater diameter ranging from 5.5 to 8.6 mm. Two or 3

Table 4 Characteristics of the Anthocyathi of the eight Western Australian Species of *Truncatoflabellum* (arranged from smallest to largest basal scar diameter).

	Greater Diameter Basal Scar (mm)	Septal Symmetry and Number	Edge Angle	Inner Edges of Larger Septa	GCD:LCD	Pairs of Edge Spines	Thecal Colour	Other Characters
<i>T. angicostomum</i>	2.8-4.3	S1-4>>S5>S6>S7 (~268 septa)	105°-180°-200°	Straight	3.0-3.2	1	White	Thecal edges usu. curved; edge spines often broken; calicular edge highly arched
<i>T. formosum</i>	4.2-5.5	20:20:40 (80 septa) common	57°-66°	Sinuus	1.8-2.1	2-3	Brown-striped	Smooth calicular edge; acrothoracican cirripede parasites
<i>T. australiensis</i>	5.5-8.6	S1-3>S4>S5 (96 septa)	44°-73°	Sinuus	1.9-2.4	2-3	Brown-striped	Calicular edge slightly scalloped
<i>T. pariparvominum</i>	6.8-14.5	S1-3>S4>S5>S6 (192 septa)	57°-138°	Straight to sl. sinuous	1.4-2.0	None	White or brown	Thecal edges acute; deep-water: over 350 m; corallium fragile
<i>T. spheniscus</i>	10-12	40-44:40-44:80-88:4-14 (~190 septa)	82°-86°	Straight, thickened	2.8-3.6	1	White	
<i>T. aculeatum</i>	10.7-15.2	S1-3>S4>S5 (96) to 25-40:25-40:50-80 (160 septa)	31°-82°	Sinuus (fine)	1.8-3.7	usu. 1	Milky white	
<i>T. veroni</i>	14.4-15.8-18.3	S1-4>S5>S6>S7 (192-212 septa)	94°-127°	Sinuus (fine)	3.0-3.2	1	White	
<i>T. macroesclera</i>	19.7-24.4-30.4	S1-4>>S5>S6>S7 (192 septa)	55°-87°	Sinuus	2.5-3.1	1	White	Columella wide: 2.5-3.5 mm

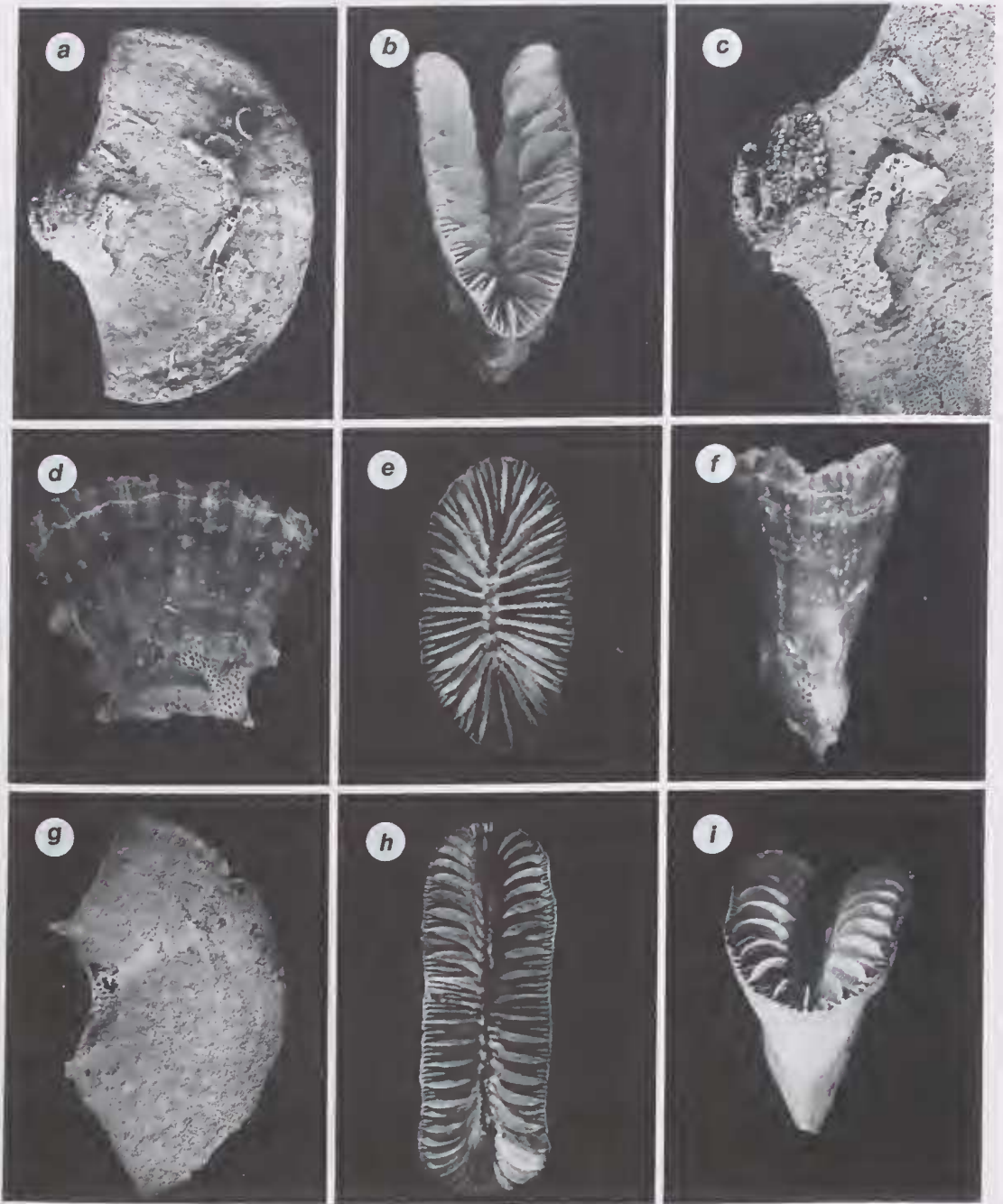


Figure 7 a-c, *Truncatoflabellum angiosomum*, holotype, SMNH 4752: a-b, side and edge views, $\times 1.5$, $\times 1.7$, respectively; c, basal scar, $\times 4.8$. d-f, *T. australiensis*: side, calicular, and edge views of holotype, $\times 2.4$, $\times 2.4$, $\times 2.8$, respectively. g-i, *T. veroni*: side, calicular, and edge views of holotype, $\times 1.2$, $\times 1.1$, $\times 1.6$, respectively.

pairs of thin thecal edge spines present, occasionally a different number on opposite edges of the same corallum. Theca only lightly encrusted with calcareous epifauna; however, one corallum (*Soela* stn 05/82/42) is heavily infested with acrothoracican cirripede borings. Theca light brown, more intensely pigmented along the S1–2 as radiating stripes. Septa hexamerally arranged in 5 cycles (S1–3>S4>S5, 96 septa), the fifth cycle complete at a GCD as small as 12 mm. S1–3 slightly exsert, having sinuous axial edges; in some specimens S3 are narrower than S1–2. S4 about 3/4 width of the S1–3; S5 quite small, only 1/5 width of the S4. Fossa deep and narrow, containing a trabecular columella about 1.3 mm wide.

Anthocaulus: Only two specimens of the attached anthocaulus stage are known (WAM 259–93, WAM 442–96, Fig 8b), both of which are still firmly attached to a short anthocyathus stage at a height of 8.8–8.9 mm. A fine, white, crescent-shaped line on the theca indicates the eventual line of transverse division, which is also indicated inside the corallum by an incipient endothecal dissepiment. Pedicel of anthocauli 1.5–1.6 mm in diameter; a pair of elongate, (up to 5 mm) hollow thecal edge spines also occurs on the anthocaulus.

Remarks

Among the approximately 28 extant species within the genus, only three others have predominantly hexamerally septal symmetry arranged in 5 cycles: *T. candeanum* Milne Edwards and Haime, 1848a; *T. carinatum* Cairns, 1989; and *T. incrustatum* Cairns, 1989 (see Cairns 1989: Table 6). *T. australiensis* is most similar to *T. candeanum*, particularly in shape, size, pigmentation, and spination, but differs in having a larger scar diameter, a non-scalloped calicular edge, and a lower face angle, which results in a larger GCD:LCD (1.95–2.35 vs 1.6–1.7 for *T. candeanum*). Furthermore, although *T. candeanum* can have 5 full cycles of septa, this number is usually not attained until a GCD of about 24 mm, whereas 96 septa are present in *T. australiensis* at the relatively small GCD of 12 mm. *T. australiensis* is relatively easily distinguished from other Western Australian *Truncatoflabellum* by having 2 or 3 pairs of thecal edge spines, brown-striped theca, and only 96 septa (Table 4).

Distribution

Western Australia: continental shelf of western coast south of Cartier Island to Houtman Abrolhos Islands; 90–180 m.

Etymology

This species is named for the continent from which it was described.

Truncatoflabellum paripavoninum (Alcock, 1894)

Flabellum pari-pavoninum Alcock, 1894: 187.

Truncatoflabellum paripavoninum – Cairns, 1989: 72–73, pl. 37, figs. j–l, pl. 38, fig. a (synonymy and description); 1995: 113–114, pl. 37, figs. d–e.—Cairns and Zibrowius, 1997: 169, fig. 22 f.

New Records

Soela: stn 01/84/60, 1, WAM 577–84; stn 01/84/77, 2: 1 (WAM 529–84), 1 (USNM 96650); stn 01/84/120, 2, WAM 699– and 702–84.

Distribution

Western Australia: continental slope of northwestern coast from north of Browse Island to south of Rowley Shoals; 394–530 m; soft substrates. Elsewhere: Indo-West Pacific from Laccadive Sea through Indonesia and Philippines and Kermadec Islands; 411–1450 m (Cairns and Zibrowius 1997).

Truncatoflabellum spheniscus (Dana, 1846)

Euphyllia spheniscus Dana, 1846: 160–161, pl. 6, figs. 1a–c.

Flabellum rubrum – Folkeson, 1919: 4–5 (in part: specimen #1).

Truncatoflabellum spheniscus – Cairns, 1989: 65–66, pl. 32, figs. g–k; 1994: 76, pl. 33, figs. a–d.—Cairns and Zibrowius, 1997: 165–166 (in part: those specimens with large basal scars).

New Records

Soela: stn 01/69, 1, WAM 371–80.

Lady: stn RW96–5, 2, NTM C8062.

Remarks

Although similar to *T. angiosomum*, particularly in septal shape and face angle, *T. spheniscus* can be distinguished from that species by its larger basal scar (10–12 mm in greater diameter), lesser edge angle (80°–90°), and smaller size with consequently fewer septa (see Table 4).

Distribution

Western Australia: continental shelf of northwestern coast (Joseph Bonaparte Gulf, Cape Jaubert and Long Island, Passage Islands); 16–32 m. Elsewhere: western Pacific from Japan through Indonesia; Gulf of Carpenteria; Torres Strait; 2–174 m (Cairns and Zibrowius 1997).

Truncatoflabellum aculeatum (Milne Edwards and Haime, 1848a)

Flabellum aculeatum Milne Edwards and Haime, 1848a: 272, pl. 8, figs. 3, 3a.

Flabellum rubrum – Folkesson, 1919: 4–5 (in part: specimens 2, 3, 5).

Truncatoflabellum aculeatum – Cairns, 1989: 61, 64, pl. 31, figs. h–l, pl. 32, figs. a–c (synonymy and description).—Cairns and Zibrowius, 1997: 166–167.

New Records

Soela: stn 04B/82/76A, 1, WAM 42–84; stn 05/82/27, 1, WAM 54–83.

Dorothea: 208 km ENE Troughton Island, 91 m, 23 X 1962, 1, WAM 257–93.

Kummunyah.: stn BG13, 3, NTM C8002.

Other records: Suomi Island, Easter Group, Abrolhos Islands, 42 m, 22 VIII 1977, 1, WAM 264–93; Roebuck Bay, Broome, 9–15 m, coll. A. A. Livingston, 1929, 3, AMS G13343.

Distribution

Western Australia: continental shelf of western coast from Cape Jaubert to Abrolhos Islands, and west of Beagle Gulf; 11–115 m. Elsewhere: western Pacific from Philippines through Indonesia to Northern Territory (Beagle Gulf and Anson Bay); 11–91 m (Cairns and Zibrowius 1997).

Truncatoflabellum veroni sp. nov.

Figures 7 g–i, 8 c

Records

Soela: stn 02/82/54A, holotype and 16 paratypes: 12 (WAM 89–83 and 91–83), 4 (USNM 96655); stn 04B/82/51A, 1 paratype, WAM 624–88; stn 05/82/12, 2 paratypes: 1 (WAM 49–83), 1 (USNM 96658); stn 05/82/unknown station between Dampier and Port Hedland, 2 paratypes, WAM 47– and 48–83.

Dorothea: 64 km W of Cape Jaubert, 40 m, 13 X 1962, 1 paratype, WAM 443–96; 208 km ENE Troughton Island, 91 m, 23 X 1962, 1 paratype, USNM 96660.

WA Hawaiian Expedition: 22 km NNW Anchor Island, Onslow, 119 m, 17 VI 1960, 1 paratype, WAM 445–96.

Kummunyah.: stn BG13, 1 paratype, NTM C8001; stn BG20, 6 paratypes, NTM C8042; stn BG21, 3 paratypes, NTM C8004; stn BG28, 1 paratype, NTM C8008; stn BG36, 1 paratype, NTM C8047; stn BG91, 1 paratype, NTM C8031; stn BG101, 2 paratypes, NTM C8054.

Lady Basten: stn LB1b(s), 2 paratypes, WAM 6–96.

Other records: Middle Pass, Darwin, 20 m, 28 XII 1994, 1 paratype, NTM C12333; Gunn Point, Shoal Bay, Darwin, 1 paratype, NTM C7994.

Type Locality

19°59'S, 117°16'E (off Port Walcott, WA); 50–52 m.

Description

Anthocyathus: Angle of straight, rounded thecal edges 94°–127°; angle of thecal faces 23°–32°. Largest specimen (the holotype) 56.5 x 17.6 mm in calicular diameter and 26.9 mm in height, with a basal scar diameter of 17.7 x 6.5 mm. Calicular edge and basal scar strongly arched, both roughly concentric to the point of attachment of anthocaulus; GCD:LCD = 3.0–3.2. Basal scar ranges from 14.4 to 18.3 mm in greater diameter (ave. = 15.85, N = 14). One pair of downward curving thecal edge spines occurs directly adjacent to basal scar; thecal spines up to 7 mm in length but usually broken or worn in larger coralla. Theca often encrusted with calcareous epifauna, including bryozoa, serpulids, and foraminifera; otherwise corallum uniformly white. Septa hexamerally arranged in 6 cycles (S1–4>>S5>S6, =192 septa), the sixth cycle complete at a GCD as low as 36 mm. Larger coralla (>50 mm GCD) often have additional primary septa (e.g., 50 equally large septa instead of 48, and some pairs of S7), the holotype having a total of 212 septa. S1–4 shaped as in *T. spheniscus* and *T. angiosomum*: notched near the calicular edge, slightly exsert, slightly constricted midway to columella, and broader near columella. Axial edges of S1–4 finely sinuous. S5 quite narrow at calicular edge, but widen to 2/3 width of S1–4 lower in fossa. S6 rudimentary. Fossa deep and elongate, containing a well-developed trabecular columella about 1.5 mm in width.

Anthocaulus 10–12 mm in height and 1.7–2.0 mm in pedicel diameter, having 1 pair of elongate thecal edge spines.

Remarks

Truncatoflabellum veroni is similar to *T. aculeatum* (see Table 4), but can be distinguished by having a larger basal scar size, a higher edge angle (usually over 90° vs less than 90°), and more septa. Except for *T. macroeschara*, it has a largest basal scar diameter of any species in the genus.

Distribution

Western Australia: continental shelf of northwestern coast from Cape Jaubert to Onslow; 40–119 m; sandy substrates. Elsewhere: Northern Territory (Anson Bay and Beagle Gulf); 15–31 m; coarse sand and gravel substrates.

Etymology

This species is named in honour of J. E. N. "Charlie" Veron, who has done much to advance our knowledge of Australian reef corals and who published several first records of azooxanthellate corals from Australia (Veron 1986).

Truncatoflabellum macroeschara sp. nov.

Figure 8 d–e, g–i

?*Flabellum* sp. Veron, 1986: 603, black and white illustration.

Records

Soela: stn 05/82/13, holotype and 1 paratype, WAM 50–83; stn 02/82/9, 1 paratype, WAM 97–83; stn 02/83/13A, 2 paratypes, WAM 77– and 98–84; stn 04B/82/64, 1 paratype, WAM 82–83; stn 05/82/60, 1 paratype, WAM 75–83; stn 05/82/65, 1 paratype, WAM 79–83.

Hai Kung: stn MFG81, 1 paratype, NMV F78390.

WA *Hawaiian Expedition*: 16–22 km NNW Anchor Island, Onslow, 119 m, 17 VI 1960, 2 paratypes: 1 (WAM 230–93), 1 (USNM 96661).

Lady Basten: stn LB4(s), 1 paratype, WAM 13–96; stn LB5(s), 1 paratype, WAM 34–96; stn LB5(t), 3 paratypes, WAM 17–96; stn LB6(t), 3 paratypes: 2 (WAM 37– and 39–96), 1 (USNM 96664).

Lady: stn RW96–14, 1 paratype, NTM C8068.

Type Locality

19°52.3'S, 117°16.1'E (east of Glomar Shoal, WA); 56–58 m.

Description

Angle of straight, rounded thecal edges 55°–87°; angle of thecal faces 22°–27°. Holotype 46.2 x 15.8 mm in calicular diameter and 22.5 mm in height, with a basal scar diameter of 25.1 x 10.1 mm; however largest specimen (WAM 39–96) 106.7 mm in GCD. Calicular edge and basal scar moderately arched; GCD:LCD = 2.5–3.1. Basal scar enormous, ranging from 19.7 to 30.4 mm in greater length and 10–12 mm in width (ave. length = 24.37 mm, N = 8). One pair of downward curving thecal edge spines occurs adjacent to basal scar. Theca often encrusted with foraminifera, serpulid tubes, bryozoans, gastropod egg cases, gastropods (limpets), and bivalves (oysters); otherwise corallum white. Septa hexamerally arranged in 6 cycles (S1–4>>S5>S6, =192 septa); however, larger coralla have additional pairs of S7 but never a full cycle. S1–4 shaped as in *T. veroni* and several other species; axial edges straight in upper fossa, but moderately sinuous adjacent to columella. S5 narrow at calicular edge but about half width of S1–4 lower in fossa. S6 rudimentary. Fossa deep and wide, containing a well-developed trabecular columella 2.5–3.5 mm in width.

Only one anthocaulus is known (WAM 230–93, Fig 8d), measuring 23.5 x 10.9 mm in calicular diameter, 15.9 mm in height, and having a pedicel 2.0 mm in diameter and a pair of thecal edge spines 7 mm long. It appears to be a mature anthocaulus, perhaps just having budded an anthocyathus.

Remarks

Truncatoflabellum macroeschara differs from all other species in the genus by having such a large basal scar and a very wide columella. Among Australian species, it is most similar to *T. veroni*. In addition to its larger basal scar and columella, *T. macroeschara* can be distinguished from *T. veroni* by its smaller edge angle (less than 90° vs more than 90°) and smaller GCD:LCD (see Table 4).

Veron's (1986: 603) illustration of a *Truncatoflabellum* implies a greater basal scar diameter of 33–34 mm, which is unlikely. The stated magnification of the figure is probably too low, and these specimens are probably either *T. macroeschara* or *T. veroni*.

Distribution

Western Australia: continental shelf of northwestern coast from Sahul Bank (Holothuria Reef) to Onslow; 58–201 m; 19°–24.1°C; sandy and rubble substrates.

Etymology

The species name *macroeschara* (Greek *makros*, long + *eschara*, scar) alludes to the extremely long basal scar of the anthocyathus.

Genus *Placotrochus* Milne Edwards and Haime, 1848a

Placotrochus laevis Milne Edwards and Haime, 1848a

Figure 8 f

Placotrochus laevis Milne Edwards and Haime, 1848a: 283, pl. 8, figs. 15, 15a.—Semper, 1872, 251–252, pl. 18, figs. 11–13.—Folkesson, 1919: 5–6.—Cairns, 1989: 75–76, pl. 39, figs. c–g (synonymy and description).—Cairns and Zibrowius, 1997: 175.

Placotrochus sp. Veron, 1986: 603, black and white fig.

New Records

Soela: stn 02/82/12A, 1, WAM 100–83; stn 02/82/54A, 9: 6 (WAM 19–88 and 447–96), 3 (USNM 96677).

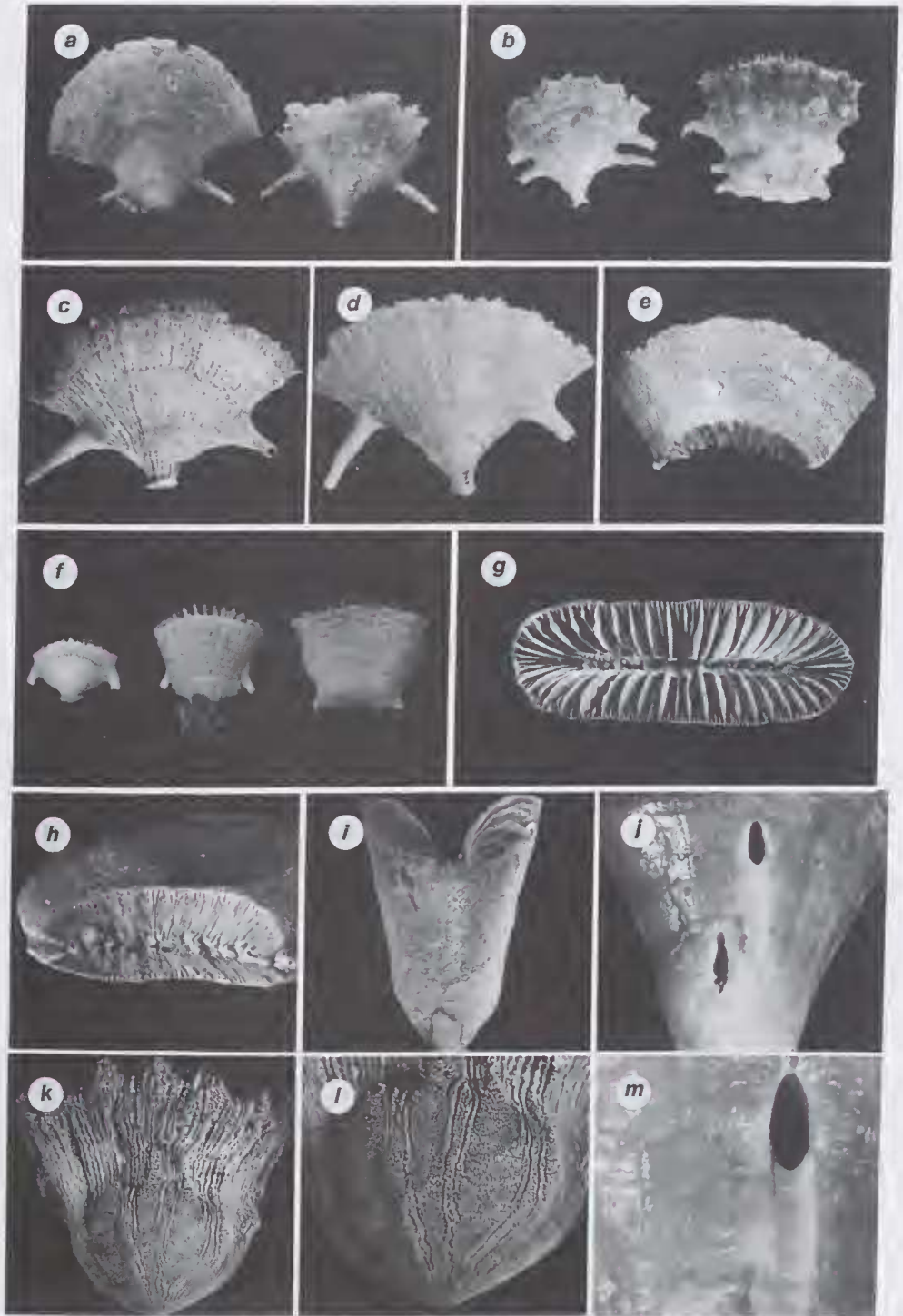
Sprightly: stn SP04/12/41, 1, WAM 227–92.

Umataka Maru: stn 6927, 2, WAM 99–84 and 219–92.

Moresby: stn 12, 1, WAM 226–92; stn 14, 1, WAM 2–83.

Lady Basten: stn LB1b(s), 1, WAM 7–96.

Kunmuniyah: stn BG2, 1, NTM C7999; stn BG13, 20, NTM C8046; stn BG20, 6, NTM C8003; stn BG21, 3, NTM C8043; stn BG26, 2, NTM C8005; stn BG27, 4, NTM C8007; stn BG28, 5, NTM C8009; stn BG36, 1, NTM C8010; stn BG39, 2, NTM C8011; stn



BG46, 2, NTM C8012; stn BG47, 2, NTM C8049; stn BG56, 2, NTM C8016; stn BG77, 53, NTM C8019; stn BG80, 3, NTM C8021; stn BG82, 70, NTM C8052; stn BG83, 2, NTM C8023; stn BG86, 3, NTM C8029.

Other records: Stn pAe, Mermaid Sound, Dampier Archipelago, 9 m, 10 II 1981, 1, WAM 341-88; stn Pac, *Ibid.*, 7-9 m, 13 II 1981, 1, USNM 96668.

Distribution

Western Australia: continental shelf of northwestern coast from Bonaparte Gulf to Dampier Archipelago; 9-90 m. Elsewhere: Indo-West Pacific from Gulf of Manaar through Indonesia and the Philippines; Northern Territory (Beagle Gulf and Anson Bay); Queensland; 6-289 m (Cairns and Zibrowius 1997).

Genus *Javania* Duncan, 1876

Javania lamprotichum (Moseley, 1880)

Figure 8 j, m

Desmophyllum lamprotichum Moseley, 1880: 41-42, figs. 1-2.

Javania lamprotichum - Cairns, 1995: 112, pl. 37, figs. b-c (synonymy and description).—Cairns and Zibrowius, 1997: 164.

New Records

Soela: stn 02/82/14, 1, WAM 101-83; stn 02/82/16, 4: 3 (WAM 103- and 104-83), 1 (USNM 96678).

Lady Basten: stn LB7(s), 2: 1 (WAM 47-96), 1 (USNM 96682).

Remarks

One specimen from *Lady Basten* station LB7(s) was infested with several large acrothoracian cirripedes (Figure 8 j, m), the elongate thecal efferent pores up to 3.6 mm in length and 1.8 mm in width. This parasitism was previously reported by Cairns and Zibrowius (1997).

Distribution

Western Australia: northwestern coast from south of Rowley Shoals to Port Hedland; 200-201 m. Elsewhere: central and western Pacific (Hawaiian Islands; Johnston Atoll; Philippines;

Kermadec Ridge); 191-842 m (Cairns and Zibrowius 1997).

Genus *Rhizotrochus* Milne Edwards and Haime, 1848a

Rhizotrochus tuberculatus (Tenison Woods, 1879)

Vasillum tuberculatus Tenison Woods, 1879: 93, pl. 10, figs. 3a, b.

Monomyces radiatus - Squires, 1966: 172, pl. 1, figs. 1-2.—Shepherd and Veron, 1982: 177, fig. 4.54f.

Monomyces - Veron, 1986: 603.

Rhizotrochus tuberculatus - Cairns and Parker, 1992: 49-50, figs. 16 g-i (synonymy and description).—Johnson, Baarli, and Scott, 1995: 95, fig. 9A-C.

New Records

Beacon Island, Wallabi Group, Abrolhos Islands, depth unknown, 24 IV 1974, 1, WAM 247-93; Salmon Point, Rottneest Island, depth unknown, 1950, 1, WAM 127-58; *Ibid.*, 1-2 m, 17 I 1991, 2: 1 (WAM 9-91), 1 (USNM 96683); Cowaramup Bay, depth unknown, 24 II 1985, 1, WAM 57-85; Cowaramup Bay, depth unknown, 21 X 1989, 1, WAM 1131-89; Ellenbrook, west of Margaret River, 1 III 1976, 1, WAM 249-93; *Ibid.*, 31 VIII 1976, 4, WAM 251-93.

Distribution

Western Australia: continental shelf of southwestern coast from Abrolhos Islands to Hopetoun, including Late Pleistocene of Cape Burney, near Geraldton; 1-2 m. Elsewhere: South Australia, Victoria, and Tasmania; 0-73 m (Cairns and Parker 1992).

Genus *Polomyces* Cairns, 1979

Polomyces wellsii Cairns, 1991

Polomyces wellsii Cairns, 1991: 22, pl. 8, figs. f, i, pl. 9, figs. a-b; 1995: 108-109, pl. 35, figs. d-f, map 10.—Cairns and Zibrowius, 1997: 160-161.

New Record

Lady: stn RW96-29, 1, NTM C8089.

Figure 8 a, *Truncatoflabellum angiosomum*, WAM 255-93, a young anthocyathus (left) and an anthocaulus (right), x 1.7. b, *T. australiensis*, paratypes, WAM 442-96, anthocaulus (left) and small anthocyathus (right), x 1.7. c, *T. veronii*, paratype, WAM 445-96, anthocaulus, x 2.3; d-e, g-i, *T. macroeschara*: d, paratype, WAM 230-93, anthocaulus, x 2.0; e, g-i, side, calicular, basal scar, and edge views of holotype, x 1.0, x 1.2, x 1.7, x 1.9, respectively. f, *Placotrochus laevis*: NTM TP32, series showing an anthocaulus with incipient fracture line, an anthocyathus still attached to anthocaulus, and a detached anthocyathus, x 2.0. j, m, *Javania lamprotichum*, *Lady Basten* stn LB7(s), USNM 96682, acrothoracian cirripede borings, x 2.4, x 13, respectively. k-l, *Endopachys bulbosa*, *Soela* stn 01/84/85, WAM 678-84, side view and enlargement of massive base, x 1.2, x 1.8, respectively.

Distribution

Western Australia: continental slope of northwestern region between Browse and Cartier Islands; 400–420 m. Elsewhere: Philippines to New Zealand; Galápagos; 355–1165 m (Cairns and Zibrowius 1997).

Genus *Gardineria* Vaughan, 1907***Gardineria hawaiiensis* Vaughan, 1907**

Gardineria hawaiiensis Vaughan, 1907: 65–66, pl. 4, fig. 1.—Cairns, 1995: 110–111, pl. 36, figs. c–f, i (synonymy and description).

New Records

Soela: stn 01/84/82, 1, WAM 676–84; stn 01/84/82A, 1, WAM 749–84.

Distribution

Western Australia: continental slope of northwestern coast from Cartier Island to south of Scott Reef; 304–400 m. Elsewhere: central and western Pacific (Hawaiian Islands; Philippines; New Zealand region); 142–602 m (Cairns 1995).

***Gardineria philippinensis* Cairns, 1989**

Gardineria philippinensis Cairns, 1989: 82, pl. 42, fig. a.—Cairns and Zibrowius, 1997: 162–163.

? *Gardineria* Veron, 1986: 603.

New Record

Soela: stn 01/84/85, 1, WAM 680–84.

Distribution

Western Australia: south of Scott Reef; 220–224 m. Elsewhere: Philippines; Indonesia; 192–494 m (Cairns and Zibrowius 1997).

Suborder Dendrophylliina**Family Dendrophylliidae Gray, 1847****Genus *Balanophyllia* Searles Wood, 1844*****Balanophyllia carinata* (Semper, 1872)**

Rhodopsammia carinata Semper, 1872: 257, pl. 19, figs. 6a–b.

Balanophyllia carinata: Zibrowius, 1985: 235–238, figs. 15–24 (synonymy and description).—Cairns and Zibrowius, 1997: 175–176.

New Records

Lady Basten: stn LB4(s), 10: 8 (WAM 11–96), 2 (USNM 96688).

Distribution

Western Australia: known only from the

continental shelf off Port Hedland; 112–124 m. Elsewhere: tropical Indo-West Pacific from Somalia to Chesterfield Islands; 33–100 m (Cairns and Zibrowius 1997).

***Balanophyllia imperialis* Kent, 1871**

Balanophyllia imperialis Kent, 1871: 284, pl. 23, figs. 5a–b.—Cairns and Zibrowius, 1997: 184–185, figs. 26 c–f (synonymy and description).

New Record

Lady Basten: stn LB5(s), 1, WAM 36–96.

Lady: stn RW96–8, 1, NTM C8067.

Distribution

Western Australia: Joseph Bonaparte Gulf and Port Hedland; 100–150 m. Elsewhere: western Pacific from South China Sea through Indonesia; 18–170 m (Cairns and Zibrowius 1997).

***Balanophyllia gigas* Moseley, 1881**

Balanophyllia gigas Moseley, 1881: 193.—Cairns, 1994: 83, pl. 35, figs. j–l (synonymy and description); 1995: 119–120, pl. 40, figs. f–h.—Cairns and Zibrowius, 1997: 182.

New Records

Soela: stn 01/84/55, 5: 4 (WAM 562–84), 1 (USNM 96689); stn 01/84/56, 3, WAM 567–84; stn 01/84/57, 1, WAM 736–84; stn 01/84/87, 1, WAM 686–84.

Distribution

Western Australia: continental slope of northwestern coast off Cape Leveque, Dampier Land; 260–352 m. Elsewhere: Japan; Hawaiian Islands; Philippines; Indonesia; New Zealand; 90–640 m (Cairns and Zibrowius 1997).

***Balanophyllia cornu* Moseley, 1881**

Balanophyllia cornu Moseley, 1881: 192–193, pl. 12, figs. 11–15.—Cairns, 1994: 82–83, pl. 35, figs. f–i (synonymy and description).—Cairns and Zibrowius, 1997: 178–179, figs. 24 d–f.

New Records

Soela: stn 02/82/13A, 7, WAM 79–, 80–, and 92–84; stn 02/82/17, 1, WAM 107–82; stn 01/84/55, 1, WAM 448–96; stn 01/84/56, 1, WAM 35–85; stn 01/84/85, 2: 1 (WAM 449–96), 1 (USNM 96690); stn 01/84/87, 1, WAM 228–92.

Remarks

Of the two growth forms described for this species (Cairns and Zibrowius 1997), the Western Australian specimens are all of the typical form, i.e., having a straight, attached corallum.

Distribution

Western Australia: continental slope of northwestern coast from south of Scott Reef to Port Hedland; 150–404 m; 9.6°–19°C. Elsewhere: Japan through Indonesia; 60–520 m (Cairns and Zibrowius 1997).

Balanophyllia generatrix Cairns and Zibrowius, 1997

Balanophyllia generatrix Cairns and Zibrowius, 1997: 183–184, figs. 25 g–i, figs. 26 a–b.

New Records

Soela: stn 01/84/55, 3 quasicolonies: 2 (WAM 17–85), 1 (USNM 96695); stn 01/84/56, 3 quasicolonies, WAM 564–84; stn 01/84/57, 2 quasicolonies, WAM 16–85; stn 01/84/75, 1 corallum, WAM 798–84; stn 01/84/120, 1 quasicolony, WAM 199–93.

Lady Basten: stn LB7(s), 13 quasicolonies: 11 (WAM 46–96), 2 (USNM 96692).

Distribution

Western Australia: continental slope of northwestern coast from west of Browse Island to south of Rowley Shoals; 200–530 m; soft substrates. Elsewhere: Philippines and Indonesia; 96–535 m (Cairns and Zibrowius 1997).

Balanophyllia spp.**Records**

Soela: stn 02/82/9, 1, WAM 96–83; stn 02/82/10A, 10, WAM 46– and 450–96; stn 02/82/13A, 2, WAM 83– and 93–84; stn 05/82/46, 1, WAM 68–83; stn 05/82/47, 1, WAM 64–83; 05/82/59, 1, WAM 704–84.

Sprightly: stn 35M, 1, WAM 362–79.

Diamantina: stn 92, 1, WAM 146–83.

Dorothea: 150 mi (240 km) ENE Troughton Island, 91 m, 1, WAM 258–93.

Other records: Abrolhos Islands, coll. Dakin, 1915, 1, WAM 128–58.

Remarks

The taxonomy of the approximately 54 valid Recent species (Best *et al.* 1995) of *Balanophyllia* is in need of revision. Whereas four species can be identified with some confidence from Western Australia, additional species occur off this coast from the Arafura Sea to Abrolhos (34–201 m), represented by the unidentified specimens listed above. But, until additional specimens are collected from this coast, and the taxonomy of the genus is better known, these specimens will remain unidentified.

Genus *Endopachys* Lonsdale, 1845

Endopachys grayi Milne Edwards and Haime, 1848b

Endopachys grayi Milne Edwards and Haime, 1848b: 82–83, pl. 1, figs. 2, 2a.—Veron, 1986: 610, black and white fig.—Cairns, 1994: 84–85, pl. 36, figs. e, h, pl. 37, fig. i (synonymy and description); 1995: 121–122, pl. 41, figs. c–h (description).—Cairns and Zibrowius, 1997: 185–186.

New Records

Soela: stn 05/82/47, 1, WAM 65–83.

Diamantina: stn 185, 1, WAM 451–96.

Lady Basten: stn LB5(s), 4, WAM 457–96; stn LB5(t), 1, WAM 16–96.

Other records: between Shark Bay and Onslow, no depth, coll. W. and W. Poole, 1966, 1, WAM 168–83.

Remarks

Veron (1986) listed another Recent species of *Endopachys* from Australia: *E. australiae* Tenison Woods, 1878b (type locality: Port Jackson, NSW, 146 m); however, the original description and figure of *E. australiae* are not consistent with a placement in this genus.

Distribution

Western Australia: continental shelf of northwestern coast off Port Hedland and Cape Farquhar; 128–150 m. Elsewhere: Indo-Pacific from southwestern Indian Ocean to Gulf of California, including Japan, New Zealand, and Hawaiian Islands; 37–386 m (Cairns and Zibrowius 1997).

Endopachys bulbosa Cairns and Zibrowius, 1997
Figure 8 k–l

Endopachys bulbosa Cairns and Zibrowius, 1997: 186, figs. 27 a–g.

New Record

Soela: stn 01/84/85, 1, WAM 678–84.

Distribution

Western Australia: off Cape Leveque (south of Scott Reef); 220–224 m. Elsewhere: Arafura Sea south of Tanimbar Islands; 233–251 m (Cairns and Zibrowius, 1997).

Genus *Notophyllia* Dennant, 1899

Notophyllia piscacauda sp. nov.
Figure 9 a–e

Notophyllia sp. Cairns and Parker, 1992: 52 ("sixth undescribed species").

Records

King George Sound, 40–51 m, Verco collection,

holotype and 4 paratypes, SAM H664; King George Sound, 22–26 m, Verco collection, 3 paratypes: 2 (SAM H663), 1 (SEM stub 857, USNM 85715).

Type Locality

King George Sound, W.A.; 40–51 m.

Description

Corallum (anthocyathus) cuneiform, with straight, rounded thecal edges and planar thecal faces. Angle of thecal edges about 33°; angle of thecal faces 10°. Holotype 6.1 × 2.8 mm in calicular diameter and 6.9 mm in height. Upper calicular edge slightly convex; GCD: LCD = 1.9–2.2. Region of basal scar highly compressed laterally and extends into 2 or 3, downward-projecting, triangular wedges: the 2 outer wedges are continuous with the thecal edges, whereas the central wedge is usually smaller (Figure 9d–e). Theca white and only slightly porous, more pores occurring on lower corallum than upper. Theca covered with tall (0.15 mm), circular to elongate (0.1–0.4 mm in length) granules (carinae) oriented longitudinally but not arranged as costae. Intercostal regions 0.05–0.06 mm wide, sometimes trapping irregularly shaped sand grains (Figure 9c). Intercostal regions contain large pores 0.8–1.0 mm in diameter, which penetrate the theca, and much more numerous and smaller (10 µm in diameter) pits. Epitheca absent. Anthocaulus unknown.

Septa hexamerally arranged in 4 cycles, pairs of S4 present only in half-systems adjacent to the principal S1, resulting in 32 septa (6:6:12:8). S1 widest and thickest septa, the inner edges of the 4 lateral S1 fusing to the lamellar columella in upper fossa. S2 dimorphic in size, those 4 occurring in the end systems being slightly less wide and thick than the S1, but the 2 S2 occurring in the lateral systems are quite small at the calicular edge, but become wider and fuse to the columella deep within fossa. S3 also dimorphic in size, the 8 in the lateral systems and adjacent half-systems being about the same size as the larger S2, whereas the 4 closest to the principal septa are quite small. The 8 S4, which occur only in the half-systems adjacent to the 2 principal septa, are equal to the smaller S3 in size. Inner edges of all septa straight; septal faces and lamellar columella finely granular.

Remarks

Two Recent and 4 fossil species have been described in the genus *Notophyllia*. Between the 2 Recent species, both of which occur off South Australia (Cairns and Parker 1992), *N. piscicauda* is most similar to *N. etheridgi*, having a similarly shaped highly compressed corallum, but differs in having 32 hexamerally arranged septa (vs 48 decamerally arranged septa), a serrated

anthocyathus base (fishtail shaped), and higher cycle septa that are proportionately much broader than those of *N. etheridgi*. *N. piscicauda* differs from the fossil species in having a more compressed corallum (higher GCD:LCD) and in having a distinctive septal arrangement.

In the course of comparing this new taxon to other species, the types of *N. variolaris* (Tenison Woods, 1878a) were borrowed, a species described from the Balcombian (Middle Miocene) of Victoria as well as the Recent of New South Wales. Only the 49 Recent syntypes were obtained (AMS G7022), 34 of which are *N. recta* and 15 of which are *N. etheridgi*. The primary description and illustration of *N. variolaris*, however, is based on a single Middle Miocene specimen, which is a valid, and different species from the Recent syntypes. This fossil specimen is herein designated as the lectotype of *N. variolaris*. Among the three fossil species, *N. piscicauda* is most similar to *N. variolaris*, both species having a similar corallum base shape and coarsely granular theca without costae. *N. piscicauda* differs in having a more elongate calice (GCD:LCD = 1.9–2.2 vs 1.4–1.8) and in having hexamerally arranged septa (those of *N. variolaris* being decamerally arranged: 10:10:20).

Distribution

Western Australia: known only from King George Sound; 22–51 m.

Etymology

The species name *piscicauda* (Latin *piscis*, fish + *cauda*, tail) is an allusion to the fishtail-shaped base of the anthocyathus.

Genus *Heteropsammia* Milne Edwards and Haime, 1848b

Heteropsammia cochlea (Spengler, 1781)

Madrepora cochlea Spengler, 1781: 240–248, figs. A–D.

Heteropsammia cochlea – Veron and Pichon, 1980: 416–420, in part: figs. 727, 729 (synonymy and description).—Veron, 1986: 576–577, color figs. 1–2, but not black and white fig. (reversed with figure for *Heterocyathus aequicostatus*, page 559).—Veron and Marsh, 1988: 123.—Hoeksema and Best, 1991: 234–237, figs. 24–28 (synonymy and diagnosis).—Veron, 1993: 339–340, fig. 53.

New Records

Umataka Maru: stn 6927, 1, WAM 220–92.

Lady: stn RW96–5, 1, NTM C8061.

Other records: stn Pac, Mermaid Sound, Dampier Archipelago, 7–9 m, 13 II 1981, 2, WAM 342– and 343–88; stn pA5, *Ibid.*, 4 II 1981, 1, WAM 352–88; stn PE4–7, *Ibid.*, 12 II 1981, 1, WAM 381–88; stn

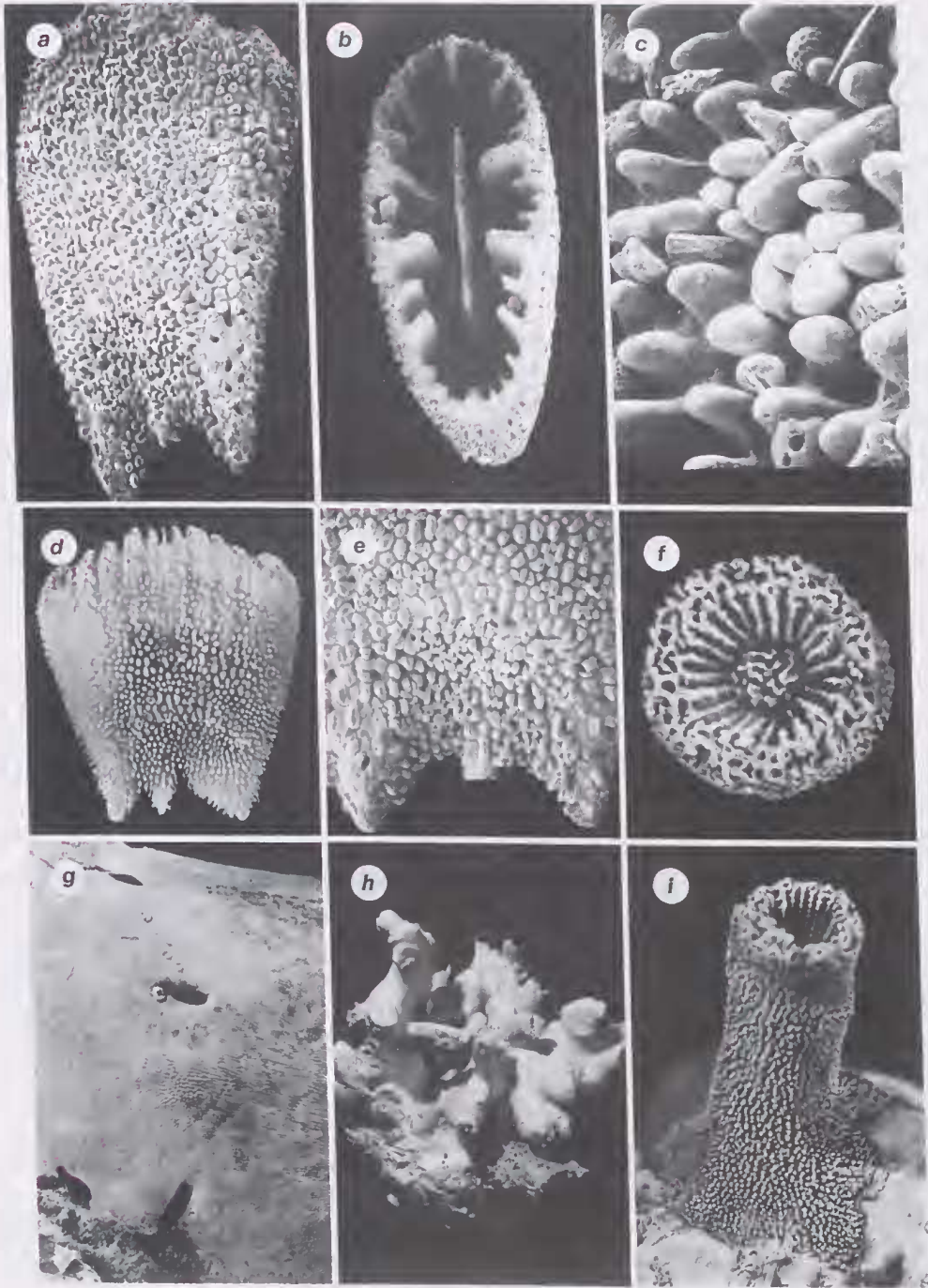


Figure 9 a-e, *Notophyllia piscacauda*, a-c, e, paratype from King George Sound, USNM 85715: a-b, side and calicular views, $\times 13$; c, sand grains lodged between costal granules in basal scar region, $\times 83$; e, "fishtail"-shaped basal scar region, $\times 15$; d, holotype, $\times 6.7$. f, i, *Leptopsammia columna*, holotype, SMNH 4756, calicular and side views, $\times 14$, $\times 7.0$, respectively. g, *Dendrophyllia alcocki*, Soela stn 01/84/55, WAM 561-84, base of colony penetrated by several acrothoracican cirripede burrows, $\times 2.8$. h, *D. boschmai*, Soela stn 02/82/15, WAM 21-83, corallum, $\times 0.5$.

SB3, 24°54'S, 113°17.8'E, 23 m, 2 V 1981, 2, WAM 700–81; stn Flinders 12, 28°39.5'S, 113°47.5'E, 37 m, 22 VIII 1977, 1, WAM 140–83; Port Essington, Cobourg Peninsula, Northern Territory, 1, NTM C8038.

Remarks

According to Veron and Pichon (1980:419), this species may be either zooxanthellate or azooxanthellate, the latter expanding its polyps only at night.

Distribution

Western Australia: continental shelf of western coast from Joseph Bonaparte Gulf to Abrolhos Islands; 9–137 m (Veron and Marsh 1988). Elsewhere: widespread in Indo-West Pacific; depth range not known (Veron and Pichon 1980; Hoeksema and Best 1991).

Genus *Rhizopsammia* Verrill, 1870

Rhizopsammia verrilli van der Horst, 1922

Rhizopsammia verrilli van der Horst, 1922: 64–65, pl. 8, figs. 1–2.—Cairns, 1991: 25, pl. 11, figs. c–e (synonymy and description).—Cairns and Zibrowius, 1997: 188–189, figs. 28 f–g.

New Records

stn "12", Egeria Point, Christmas Island, 9–20 m, 19 II 1987, 1 colony, WAM 385–87; stn "13", Northwest Point, Christmas Island, 19 II 1987, 2 colonies, WAM 386–87; Lost Lake, Christmas Island, 1–2 m, 18 II 1987, 1 colony, WAM 384–87; 13°56'S, 125°37'E (Cassini Island, Kimberley), "SCUBA" depth, 18 VIII 1991, 1 colony, WAM 147–91; 20°28'30"S, 116°32'E, 26 V 1974, 3 colonies: 2 (WAM 10–76), 1 (USNM 96701); Ningaloo, Winderabandi, 5–12 m, 4 VIII 1985, 2 colonies, WAM 956–85; 26°10'10"S, 113°11'00"E, 2 m, 15 IV 1979, 7 colonies, WAM 451– and 552–79; stn C71, Leo Island, Abrolhos, 38 m, 1 IX 1972, 1 corallite, WAM 71–73.

Remarks

Living specimens are orange-pink to pale pink in colour. Other azooxanthellate species, such as *Culicia australiensis* and *Thalamophyllia tenuescens*, often encrust the same substrate as *R. verrilli*.

Distribution

Western Australia: continental shelf of western coast from Kimberley to Abrolhos Islands; Christmas Island; 2–38 m. Elsewhere: South Pacific, including Philippines, Indonesia, Palau, Cocos Islands (eastern Pacific) and Galápagos Islands; 5–278 m (Cairns and Zibrowius 1997).

Genus *Dendrophyllia* Blainville, 1830

Dendrophyllia alcocki (Wells, 1954)

Figure 9g

Sclerhelia alcocki Wells, 1954: 465–466, pl. 177, figs. 1–2.

Dendrophyllia alcocki – Zibrowius, 1974a: 570–573, figs. 10–14.—Cairns, 1995: 126–127, pl. 43, figs. g–i, pl. 44, figs. a–b (synonymy and description).—Cairns and Zibrowius, 1997: 193.

New Record

Soela: stn 01/84/55, 1 colony, WAM 561–84.

Remarks

The specimen reported above bears 9 characteristic lenticular-shaped burrows of an acrothoracican cirripede crustacean, each burrow having an aperture 3.0–3.1 mm in length and 0.8–1.3 mm in width (Figure 9g). All burrows occurred on the encrusting base of the corallum, as well as in the calcareous substrate on which the coral was attached. Whereas these boring cirripedes have been reported previously from deep-water Scleractinia (Grygier and Newman 1985; Cairns and Zibrowius 1997), this is the first record of this parasitic association between an acrothoracican and *D. alcocki*.

Distribution

Western Australia: continental slope off Cape Leveque, Dampier Land; 296–298 m. Elsewhere: Indo-West Pacific from the Maldive Islands to New Zealand, including the Marshall Islands and South China Sea; 118–616 m (Cairns and Zibrowius 1997).

Dendrophyllia arbuscula van der Horst, 1922

Dendrophyllia arbuscula van der Horst, 1922: 53, pl. 8, fig. 6.—Wells, 1964: 108.—Cairns, 1994: 90–91, pl. 38, figs. i–l (synonymy and description); 1995: 125–126, pl. 43, figs. e–f.—Cairns and Zibrowius, 1997: 192–193, figs. 29 a–c.

Dendrophyllia – Veron, 1986: 578, in part: black and white fig.

New Records

Long Island, Wallabi Group, Abrolhos, 24–30 m, 16 IV 1978, 1 colony, WAM 207–78; Evening Reef, Abrolhos, 49 m, 2 colonies: 1 (WAM 172–81), 1 (USNM 96703); Sorrento, north of Fremantle, 5 m, IV 1971, 3 colonies, WAM 68–78; Armstrong Bay, Rottneest Island, 1–2 m, 14 II 1985, 4 colonies, WAM 328–89.

Remarks

Living specimens are orange-red in colour.

Distribution

Western Australia: continental shelf of

southwestern coast from Abrolhos Islands to Rottneest Island; 2–49 m. Elsewhere: Indo-west Pacific from southwestern Indian Ocean to northern New Zealand, including Japan; 40–353 m (Cairns and Zibrowius 1997).

Dendrophyllia boschmai van der Horst, 1926

Figure 9h

Dendrophyllia boschmai van der Horst, 1926: 44.—
Cairns, 1994: 91 (synonymy and diagnosis).

New Records

Soela: stn 02/82/14, 1 branch, WAM 19–83; stn 02/82/15, 1 large colony and 2 branches: colony and 1 branch (WAM 21–83), 1 branch (USNM 96706).

Distribution

Western Australia: northwestern coast off Port Hedland; 200–201 m; 16.0°–16.3°C. Elsewhere: previously known only from off Japan and South Korea; 40–165 m (Cairns 1994).

Dendrophyllia spp.

Dendrophyllia sp. – Veron, 1986: 579, fig. 4.—
Grygier, 1991: 42, figs. 21 D–E.

Records

Kendrew Island, Dampier Archipelago, 4 m, 5 VIII 1978, 1, WAM 412–78; Mangrove Bay, North West Cape, 13 m, 26 V 1980, 1, WAM 63–81; Long Island, Wallabi Group, Abrolhos, 6–30 m, 11–16 IV 1978, 3, WAM 204–, 205–, and 206–78; *Ibid.*, Beacon Island, V 1978, 1, WAM 602–78; Hopetoun jetty, 12 I 1986, 1, WAM 415–86.

Remarks

Like *Balanophyllia*, the taxonomy of the 24 Recent species (Best et al. 1995) of *Dendrophyllia* is in need of revision. Specimens unidentified to species occur from Dampier Archipelago to Hopetoun at depths of 4–30 m.

Genus *Tubastraea* Lesson, 1829

Tubastraea coccinea Lesson, 1829

Tubastraea coccinea Lesson, 1829: 93.—Wells, 1983: 243–244, pl. 18, figs. 1–2 (synonymy).—Veron, 1986: 580–581 (2 figs.).—Ogawa and Takahashi, 1993: 98, pl. 1, figs. 1–8, pl. 2, figs. 1–4, pl. 5, figs. 1–5.—Cairns, 1994: 93–94, pl. 39, figs. g–i (synonymy and description).—Cairns and Zibrowius, 1997: 197.

Tubastrea aurea – Wells, 1964: 109.—Veron, 1986: 584, fig. 1.

New Records

Stn "16", 13°56'S, 125°37'E, 17 VIII 1991, 1, WAM 148–91; stn "35", 15°21'S, 123°32'E, 24 VIII 1991, 1, WAM 155–91; Kendrew Island, Dampier Archipelago, 3–8 m, 1971–1978, 5, WAM 48–72, 128–73, 69– and 411–78, and NMV F78384; stn "142", Hermide Island, Monte Bello Islands, 3–4 m, 12 XII 1979, 1, WAM 392–80; Yardie Creek, North West Cape, 19 VI 1977, 1, WAM 211–77; Ningaloo, North West Cape, VIII 1973, 1, WAM 70–78; stn B19, Cape Couture, Bernier Island, 1 m, 10 III 1980, 1, WAM 116–81; Dirk Hartog Island, 4 m, 30 V 1957, 3, WAM 16– and 23–59; Monkey Rock, Shark Bay, 2–3 m, 4 IV 1979, 1, WAM 455–79; 26°10'20"S, 113°11'W, 2 m, 11 IV 1979, 1, WAM 550–79; Wallabi Group, Abrolhos Islands, 9 m, 13 IV 1978, 1, WAM 140–78; stn C31, Easter Group, Abrolhos Islands, 0.3 m, 30 VIII 1972, 1, WAM–31–73; Cockburn Sound, XI 1957, 1, WAM 465–78; Carnac Island, 2–3 m, 9 XII 1977, 2, WAM 192–78; Rottneest Island, 1956–1985, 1–2 m, 7: WAM 141–58, 139–58, 64–78, and 88–85, USNM 83687, USNM 83689, and NMV F78386; Little Armstrong Bay, Rottneest Island, roof of cave, 3–5 m, 5 II 1993, 1 colony, SAM H876.

Remarks

Living specimens are bright orange in colour (Veron 1986).

Distribution

Western Australia: continental shelf of western coast from Cassini Island to Rottneest Island; 0.3–20 m; common in caves and under ledges. Elsewhere: cosmopolitan in tropical and warm temperate waters; 1.5–110 m (Cairns and Zibrowius 1997).

Tubastraea diaphana (Dana, 1846)

Dendrophyllia diaphana Dana, 1846: 389, pl. 27, fig. 3.

Tubastraea diaphana – Wells, 1964: 108.—Veron, 1986: 582 (fig. 2), 585 (center unnumbered fig.).—Ogawa and Takahashi, 1993: 99, pl. 2, figs. 9–10, pl. 5, fig. 7.—Cairns and Zibrowius, 1997: 196–197 (synonymy and diagnosis).

New Records

Kendrew Island, Dampier Archipelago, 2–9 m, 1972–1974, 9 colonies, WAM 165–, 257–, and 173–73, 92–74; Hermite Island, Monte Bello Islands, 11 XII 1979, 1, WAM 390–80; Mandu Mandu, North West Cape, 22 V 1980, 1, WAM 200–81; Yardie Creek, North West Cape, 20 VI 1977, 1, WAM 213–77; 21°51'50"S, 116°09'30"E, 2–4 m, 29 V 1981, 1, WAM 587–81; Ningaloo, 0–1 m, 6 VIII 1985, 2, WAM 936–85; Bernier Island, Cape Couture, 10 III 1980, 2, WAM 110–81; Dirk Hartog Island, 0–1 m, 5 IV 1979, 2, WAM 17–59 and 453–79; South Pass, Shark Bay, 12 m, 15 IV 1979, 1, WAM 558–79; stn "11", 26°08'30"S, 113°08'10"E, 8 IV 1979, 1, WAM 563–79;

Long Island, Wallabi Group, Abrolhos Islands, 3–30 m, IV 1978, 7 colonies, WAM 193–, 194–, 197–, 198–, 200–, 202–, and 203–78; Beacon Island, Wallabi Group, Abrolhos Islands, 23 IV 1974, 3, WAM 66–78; *Ibid.*, 31 m, 1, WAM 479–77; Easter Group, Abrolhos Islands, 0.2 m, 30 VIII 1972, 1, WAM 52–73; Green Head, 4 m, VI 1979, 1, WAM 969–79; Little Island, Sorrento, 14 XII 1977, 3, WAM 196–78; Cockburn Sound, IX 1957, 2, WAM 464–78; Rottneest Island, 1956, 1, WAM 138–58.

Remarks

Living specimens are black to dark green in colour (Veron 1986).

Distribution

Western Australia: continental shelf of western coast from Dampier Archipelago to Rottneest Island; 0–30 m; common in caves, on vertical walls, and under ledges. Elsewhere: widespread in tropical Indo-west Pacific from southwestern Indian Ocean to Fiji; 1–54 m (Cairns and Zibrowius 1997).

Tubastraea micranthus (Ehrenberg, 1834)

Oculina micranthus Ehrenberg, 1834: 304.

Tubastraea micranthus – Schuhmacher, 1984: 94, figs. 1a–b, 4.—Cairns and Zibrowius, 1997: 195–196 (synonymy and description).

Tubastrea micrantha – Wells, 1964: 108.—Veron, 1986: 583 (fig. 3), 585 (figs. 3, 7).—Ogawa and Takahashi, 1993: 99–100, pl. 4, figs. 1–6, pl. 6, figs. 5–6.

New Records

Stn "11", Ashmore Reef, 10–20 m, 15 VIII 1986, 1, WAM 593–86; Kendrew Island, Dampier Archipelago, 6–9 m, 23 V 1972, 1 branch, WAM 49–72; stn "ML3", Noname Bay (20°36'S, 116°45.5'E), Dampier Archipelago, 4–6 m, 1, WAM 413–78.

Remarks

Living specimen are black to dark green-black in colour (Veron 1986).

Distribution

Western Australia: Ashmore Reef and Dampier Archipelago; 6–10 m. Elsewhere: widespread in tropical Indo-West Pacific from southwestern Indian Ocean to Fiji; 0–60 m (Cairns and Zibrowius 1997).

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STATION LIST

	Latitude (°S)	Longitude (°E)	Depth (m)	Date	Temperature (°C)
<i>RV Akademik Oparin</i>					
unnumbered	19°19.7'	119°09.8'	50	19 VII 1987	
<i>Alpha Helix</i>					
M-14	11°33.5	135°52.5	22	2 VI 1979	
<i>FV Courageous</i>					
001	17°25'	119°52'	300-432	14 VIII 1983	
002	18°05'	118°10'	400-401	17 VIII 1983	
003	18°01'	118°13'	450-452	17 VIII 1983	
004	18°06.5'	118°10'	353-356	17 VIII 1983	
011	16°53'	119°53'	339-438	19 VIII 1983	
013	16°49'	119°59'	439-468	19 VIII 1983	
?015	16°50'	120°03'	433-434	20 VIII 1983	
017	16°58'	120°07'	428-432	20 VIII 1983	
018	16°56'	120°06'	431	20 VIII 1983	
020	17°49'	118°41'	308-310	21 VIII 1983	
022	17°55'	118°22'	437-442	21 VIII 1983	
023	17°57'	118°19'	431-433	21 VIII 1983	
025	18°02'	118°14'	409-410	22 VIII 1983	
026	18°05'	118°08'	440-442	22 VIII 1983	
033	18°34'	117°17'	475-477	23 VIII 1983	
090	16°42'	120°10'	390	4 IX 1983	
<i>DEKI</i>					
3	5°32'	132°36'	245	31 III 1922	
<i>HMAS Diamantina</i>					
20	31°44'	114°56'	402-448	16 III 1976	
25	31°48'	114°58'	402	16 III 1976	
45	31°00'	114°51'	80	17 III 1976	
55	29°15'	114°01'	146	20 III 1976	
76	31°30'	114°56'	146	23 III 1972	
92	26°30'	112°54.2'	146	7 XII 1970	
173	21°50'	113°46'	137	6 X 1963	
185	23°25'	113°14'	?	7 X 1963	
186	23°23'	113°09'	278	7 X 1963	
208	27°40'	113°20'	130	10 X 1963	
<i>O.R.V. Franklin</i>					
GAB033	33°00'	128°00'	83	17 VII 1995	
GAB042	33°26'	125°58'	234	18 VII 1995	
GAB063	32°52'	125°04'	46	20 VII 1995	
<i>MV Espiritu Santo</i>					
E68-743	19°29'	116°01'	137	1 XII 1968	
<i>Hai Kung</i>					
MFG81	19°35'	117°15'	73-80	10 III 1981	
<i>Hokuho Maru</i>					
KH72-1-30	12°24.8'	128°00.1'	115	25 VI 1972	
<i>KARUIBAR</i>					
44	7°52'27"	132°48'24"	291-295	29 X 1991	
49	7°59'51"	132°58'50"	206-209	29 X 1991	
65	9°14'01"	132°28'28"	174-176	1 XI 1991	
86	9°23'59"	131°14'29"	222-226	4 XI 1991	
<i>MV Kunmunyah</i>					
BG 2	13°27.96'	129°56.10'	7	1 X 1993	
BG 13	13°22.14'	129°53.40'	24	2 X 1993	
BG 20	13°19.14'	129°56.28'	29	2 X 1993	
BG 21	13°19.14'	129°56.10'	31	2 X 1993	
BG 26	13°16.08'	129°55.92'	23	3 X 1993	

	Latitude (°S)	Longitude (°E)	Depth (m)	Date	Temperature (°C)
BG 27	13°15.90'	129°58.86'	19	3 X 1993	
BG 28	13°15.90'	130°01.86'	20	2 X 1993	
BG 36	13°10.26'	129°55.62'	15	3 X 1993	
BG 39	13°07.08'	129°56.04'	15	3 X 1993	
BG 46	13°00.90'	129°58.92'	14	4 X 1993	
BG 47	13°00.96'	130°01.92'	17	4 X 1993	
BG 56	12°52.02'	130°11.10'	6	4 X 1993	
BG 77	12°33.60'	130°27.90'	16	6 X 1993	
BG 80	12°31.02'	130°17.22'	17	5 X 1993	
BG 82	12°30.96'	130°22.92'	9	6 X 1993	
BG 83	12°31.02'	130°28.98'	28	6 X 1993	
BG 86	12°27.78'	130°22.98'	13	6 X 1993	
BG 91	12°25.44'	130°25.92'	19	6 X 1993	
BG101	12°19.02'	130°34.02'	19	7 X 1993	
BG141	12°07'02"	130°07'02"	20	10 X 1993	
<i>R/V Lady</i>					
RW96-5	14°12.8'	128°41.3'	32	10 VI 1996	
RW96-7	13°21.02'	128°10.44'	77	10 VI 1996	
RW96-8	12°52.66'	127°53.06'	100	13 VI 1996	
RW96-14	12°59.09'	124°43.65'	80	12 VI 1996	
RW96-17	12°42.86'	123°57.98'	180	13 VI 1996	
RW96-18	12°43.08'	123°33.21'	280	13 VI 1996	
RW96-19	12°43.00'	123°28.59'	350	13 VI 1996	
RW96-29	13°06.44'	123°15.43'	400-420	19 VI 1996	
RW96-30	13°07.89'	123°12.65'	420	19 VI 1996	
RW96-31	13°39.09'	123°07.05'	350	19 VI 1996	
<i>R/V Lady Basten</i>					
LB1b(s)	20°10'	116°58.5'	45	17 VIII 1995	
LB3(t)	19°29.7'	117°26.6'	78	17 VIII 1995	
LB4(s)	19°08.4'	117°44'	112-124	17 VIII 1995	
LB5(s)	18°42.8'	118°03.2'	150-160	18 VIII 1995	
LB5(t)	18°36.6'	118°07'	150-160	18 VIII 1995	
LB6(s)	18°06.9'	118°56.7'	173-193	18 VIII 1995	
LB6(t)	18°09.5'	118°54.5'	173-193	18 VIII 1995	
LB7(s)	17°54.2'	116°17.5'	200	18 VIII 1995	
LB8(t)	17°48.7'	119°22.3'	250	18 VIII 1995	
<i>FV Longva III</i>					
"1"	38°18'	124°43'	945-1220	8 XII 1989	
"2"	34°13'	125°01'	912-963	8 XII 1989	
<i>HMS Moresby</i>					
12	14°36.9'	128°47.8'	?	30 IX 1980	
14	14°35.2'	128°55.2'	?	30 IX 1980	
<i>FV Saxon Progress</i>					
RP-8	34°45'	119°32.4	525-550	18 VIII 1988	
<i>Soela 01/79</i>					
unnumbered	19°34'	116°08'	101	19 VIII 1979	
18	19°32'	116°00'	144	3 XII 1979	
66	20°57'	115°40'	12	10 XII 1979	
69	20°50'	115°40'	16	10 XII 1979	
<i>Soela 02/82</i>					
9	18°33'	118°22'	150	28 III 1982	19.0°
10A	18°47'	117°58'	154	28 III 1982	
10B	18°47'	117°58'	?	29 III 1982	
12A	19°29'	118°22'	56	1 IV 1982	
13A	18°25'	118°22'	201	2 IV 1982	
14	18°31'	118°09'	200-201	2 IV 1982	16.3°
15	18°40'	117°53'	200	2 IV 1982	16.0°
16	18°41'	117°54'	200-204	2 IV 1982	16.2°
17A	18°01'	118°17'	410-420	3 IV 1982	

	Latitude (°S)	Longitude (°E)	Depth (m)	Date	Temperature (°C)
17	17°48.1'	118°30'	404	3 IV 1982	9.6°
18	18°08'	118°06'	404	3 IV 1982	9.6°
19	18°35'	117°00'	588-592	4 IV 1982	8.5°
21	18°45'	116°26.5'	590-592	4 IV 1982	9.0°
22	18°40'	116°27.5'	720-724	5 IV 1982	8.4°
26	18°37'	116°46'	696-700	6 IV 1982	10.0°
27	18°41'	116°29.5'	696-704	6 IV 1982	8.7°
28	18°41'	116°44'	594-596	6 IV 1982	
29	18°43'	116°35'	610-612	7 IV 1982	8.2°
31	18°41'	116°56'	500	7 IV 1982	7.8°
34	18°29'	117°32'	496-500	8 IV 1982	8.2°
35	17°34'	118°38'	472-520	10 IV 1982	8.5°
38	18°22'	117°56'	309-316	10 IV 1982	10.0°
40	18°34'	117°40'	304	11 IV 1982	10.7°
41	18°26'	117°34'	416-418	11 IV 1982	9.6°
43	18°40'	117°13'	300-306	13 IV 1982	12.0°
45	18°49'	116°50'	400-406	13 IV 1982	9.1°
46	18°41'	116°45'	506-508	13 IV 1982	8.5°
51	19°13'	117°39'	100	15 IV 1982	23.1°
54	19°15'	116°59'	152-156	15 IV 1982	
54A	19°59'	117°16'	50-52	15 IV 1982	28.8°
<i>Soela 04/82</i>					
8A	18°55'	116°41'	380	1 VIII 1982	
8B	18°46'	117°41'	360	1 VIII 1982	19.0°
8C	18°43'	117°12'	368	1 VIII 1982	
51A	20°10'	116°34'	49	15 VIII 1982	
64	19°25'	117°11'	90-98	17 VIII 1982	
71	18°30.1'	118°36.2'	136-146	19 VIII 1982	
74	18°43'	118°17'	144	19 VIII 1982	
76A	18°57'	118°28'	95	19 VIII 1982	
<i>Soela 05/82</i>					
12	20°01'	117°13.1'	46-49	27 IX 1982	
13	19°52.3'	117°16.1'	56-58	27 IX 1982	
22	20°34'	116°06.4'	28-30	29 IX 1982	
27	19°51.8'	116°30'	62	29 IX 1982	22.9°
36	19°10'	116°57.2'	180-190	1 X 1982	17.4°
37	19°19.2'	116°46.3'	132-144	1 X 1982	21.5°
42	18°58'	117°36.2'	140-164	2 X 1982	23.5°
46	19°01.7'	117°59.3'	102-106	2 X 1982	
47	18°39.3'	118°57'	128-130	3 X 1982	22.8°
51	19°03'	118°15'	74-83	3 X 1982	
55	19°08.9'	118°46'	81-82	4 X 1982	
59	19°36.2'	118°39.3'	33-34	5 X 1982	
60	19°28.1'	118°27.1'	62.66	5 X 1982	24.1°
61	19°31.2'	118°06.9'	65-68	5 X 1982	
63	19°34.2'	117°57.4'	60-65	5 X 1982	23.9°
65	19°34.0'	117°18.3'	78-84	6 X 1982	23.5°
71	19°53'	117°55'	40	7 X 1982	
<i>Soela 01/84</i>					
24	18°41'	117°28'	304	1 II 1984	
49	16°58.7'	119°55.6'	430-432	9 II 1984	
51	15°40.2'	120°37.3'	500-504	10 II 1984	
52	15°46.4'	120°39.9'	446-450	10 II 1984	
53	15°48'	120°41'	396-400	10 II 1984	
54	15°51.2'	120°44.3'	348-350	10 II 1984	
55	15°57'	120°46.2'	296-298	10 II 1984	
56	15°20'	121°11.2'	300-302	11 II 1984	
57	15°13.5'	121°08.9'	352	11 II 1984	
59	15°09.4'	121°05.5'	448-450	11 II 1984	
60	15°08.6'	121°05.4'	500-504	11 II 1984	
61	14°39.5'	121°28.5'	500-506	12 II 1984	
63	14°43.1'	121°33.1'	408-410	12 II 1984	
64	14°50.2'	121°31.4'	356	12 II 1984	

	Latitude (°S)	Longitude (°E)	Depth (m)	Date	Temperature (°C)
65	14°49'	121°36.1'	300-302	12 II 1984	
66	14°29.4'	122°01.4'	296-304	12 II 1984	
67	14°21.5'	122°02.4'	348-350	12 II 1984	
70	13°44'	122°13.3'	494-496	13 II 1984	
71	13°50.3'	122°18.5'	450-452	13 II 1984	
72	14°07.5'	122°29.4'	406-408	13 II 1984	
74	14°16.5'	122°34.4'	302	14 II 1984	
75	13°51.4'	123°01.8'	306-308	14 II 1984	
76	13°44.5'	122°56.5'	348-350	14 II 1984	
77	13°33.3'	122°51.5'	390-394	14 II 1984	
78	13°27.6'	122°44.4'	440-444	14 II 1984	
79	13°17'	122°37.4'	484-494	15 II 1984	
80	12°48.1'	122°56.7'	496-504	15 II 1984	
81	12°54.4'	123°00.2'	452-463	15 II 1984	
82	13°07.2'	123°15.7'	400	15 II 1984	
82A	14°35.8'	121°49.4'	300-304	16 II 1984	
85	14°52.5'	121°41.7'	220-224	16 II 1984	
87	15°11.1'	121°26.9'	258-260	17 II 1984	
91	16°08'	120°19.5'	544-550	18 II 1984	
92	16°09.5'	120°08.8'	596-600	18 II 1984	
94	16°55.8'	119°53.9'	426	19 II 1984	
96	16°55.4'	119°54.1'	431-432	19 II 1984	
98	16°56.7'	119°51.2'	432	20 II 1984	
99	16°56.8'	119°51'	430-432	20 II 1984	
100	16°55.9'	119°52'	432-436	20 II 1984	
101	16°56.9'	119°50.9'	432	20 II 1984	
102	16°55.2'	119°52.8'	430-432	20 II 1984	
105	16°56.9'	119°52'	432	21 II 1984	
107	16°55.2'	119°54.9'	432	21 II 1984	
108	16°54.1'	119°55.6'	434	21 II 1984	
109	16°54.1'	119°54.2'	433-434	22 II 1984	
111	16°55.1'	119°54.8'	430-432	22 II 1984	
112	16°55'	119°56'	432-434	22 II 1984	
113	16°57'	119°51'	436	22 II 1984	
116	16°55.4'	119°52.3'	436-448	23 II 1984	
118	16°54'	119°52'	440	23 II 1984	
119	16°51'	119°48'	464-466	23 II 1984	
120	18°01'	118°11'	530-560	24 II 1984	
121	18°04'	118°14'	396-400	24 II 1984	
122	17°59'	118°23'	389-390	24 II 1984	
<i>MV Sprightly</i>					
19M	29°14'	114°04'	165	17 II 1976	
20M	29°21'	114°07'	146	18 II 1976	
28M	29°08.5'	113°54.8'	183	19 II 1976	
30M	29°07.5'	113°57.4'	110	19 II 1976	
33M	29°06.7'	113°58.5'	91	19 II 1976	
34M	29°07.2'	113°56.4'	141	19 II 1976	
35M	29°07.5'	114°10'	64	19 II 1976	
40M	30°15.9'	114°38.6'	137	19 II 1976	
41M	30°16.8'	114°39.6'	82	19 II 1976	
SP4/82/41	15°40.7'	122°13.9'	40	28 IV 1982	
<i>FV Surefire</i>					
5	18°46'	116°24'	?	7 II 1992	
<i>Umataka Maru</i>					
6920	S of Rowley Shoals		260	20 XII 1969	
6921	S of Rowley Shoals		300	20 XII 1969	
6922	S of Mermaid Reef, Rowley		340	20 XII 1969	
6926	S of Rowley Shoals		266	20 XII 1969	
6927	W of Broome		90	21 XII 1969	
6930	NW of Browse Island		380	23 XII 1969	